A Housing Energy Management Program Report

Energy
Ontario

IMPROVING THE PERFORMANCE
OF RESIDENTIAL HYDRONIC SYSTEMS
IN EXISTING HOUSES

(PHASE I)

Funding was provided by the Ministry of Municipal Affairs and Housing through funds provided by the Ministry of Energy, through the Housing Energy Management Program (H.E.M.P.).

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by

THE HEATING, REFRIGERATING & AIR CONDITIONING INSTITUTE
OF CANADA (H.R.A.I.)

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INTRODUCTION

The Heating, Refrigerating And Air Conditioning Institute (H.R.A.I., a national trade association for these industries, was commissioned by the Ontario Ministry of Municipal Affairs And Housing, Research And Development Section, with funds provided by the Ministry Of Energy under the Housing Energy Management Program (HEMP), to undertake the development and testing of a program to reduce the energy consumption of existing houses, with hydronic systems, by improving the performance of their heating and distribution systems.

The program objectives were as follows:

(1) Develop a heating system services checklist for homeowners.

(2) Implement a maintenance package (tune-up) for each home.

(3) Improve the comfort level in each house.

(4) Ascertain the energy savings.

(5) Develop a retrofit package for each house.

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PART A

BACKGROUND

The Ministry of Municipal Affairs and Housing, with the assistance of the City Of Brampton, selected eighteen houses for this project. Nine were heated with oil, seven with natural gas, and two with electric furnaces. The age of the houses varied from thirty to one hundred and fifty years old.

The owners of these homes were invited to a meeting, during which the details of the program were outlined and their co-operation enlisted. A free heating system tune-up together with a retrofit assessment was offered to the building owners. They in turn were required to provide records of energy consumption for the period before and after the tune-up and promise not to undertake any large energy measures for one year.

The tune-ups, for purposes of this program, were to be more comprehensive than those normally carried out. They included an in-depth analysis of the heating system and the envelope, in order to ascertain the condition of existing systems. Several additional tests were conducted both before and after the tune-ups, in order for us to determine the immediate affects of the work done.

To best utilize the skills of the service technicians who carry out the actual tune-ups, two checklists were developed. The first, to be used by the project manager during an initial visit to the home. This was used to gather relevant information on the occupant's living habits, the house envelope, comfort complaints and other information that would assist the service technician when he arrived to conduct the actual tune-up.

The second checklist is for the service mechanic and consists of three checklists; one for gas, one for oil and one for electric systems. These were prepared by the project manager, W. D. Geddes, and a team of knowledgeable contractors selected from H.R.A.I.'s membership.

The tune-ups took a total system approach. The boiler, distribution and control parts were considered as an integral system. Since these tune-up checklists were developed for eventual use in the open market, they listed most items that could be undertaken to reduce energy consumption in a given short period. The distribution system was also addressed. However, it is not possible to tune a hydronic distribution system to the same extent as a forced air system.

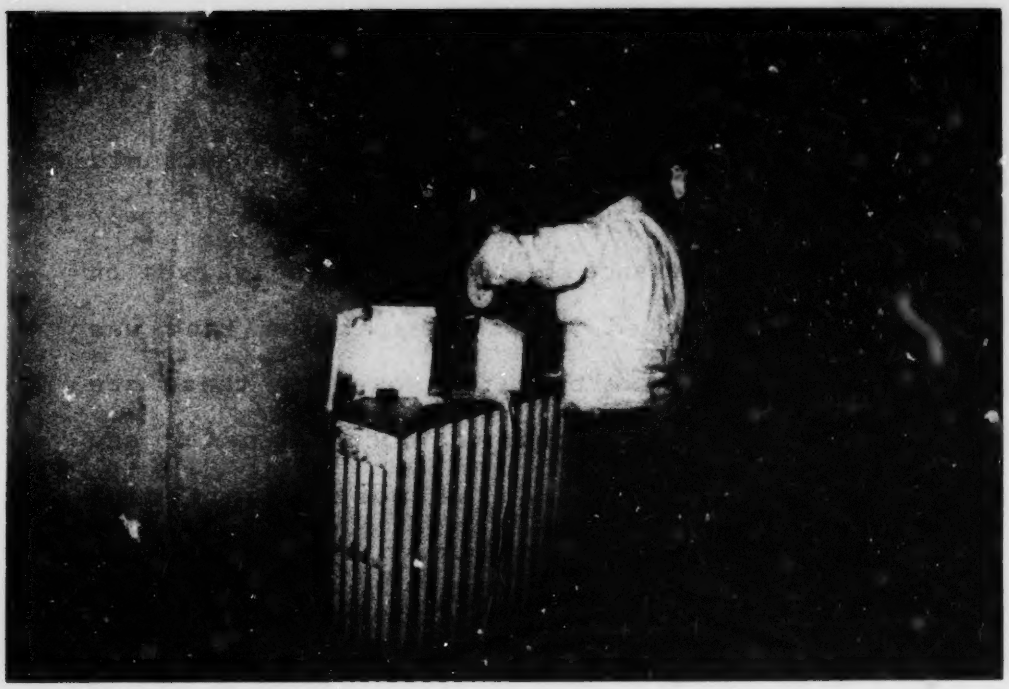
TUNE-UP RESULTS

The tune-ups resulted in some immmediate improvements in most houses.

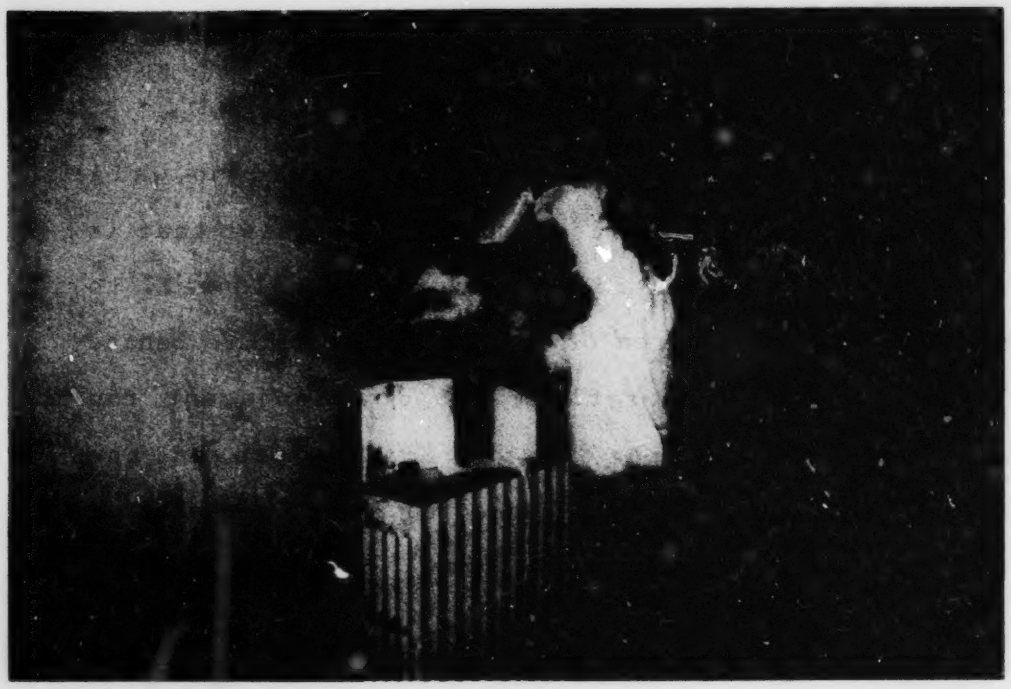
DISTRIBUTION SYSTEM

There was little actual tuning done to the hydronic distribution systems because by the very nature of their design, little maintenance is required. The valves on all the rads were bled and the expansion tank was drained and recharged with air. However, these are regular maintenance items that the occupant can do and in many cases had done. The most significant improvement made to the distribution system, and the single activity that may yield the greatest reduction in energy consumption, was the placement of a piece of single or double sided aluminum foil behind each rad. This material comes in large rolls and consists of aluminum foil cemented to an insulating paper backing. The backing also provides rigidity, making it easy to stand a piece of this material behind each rad.

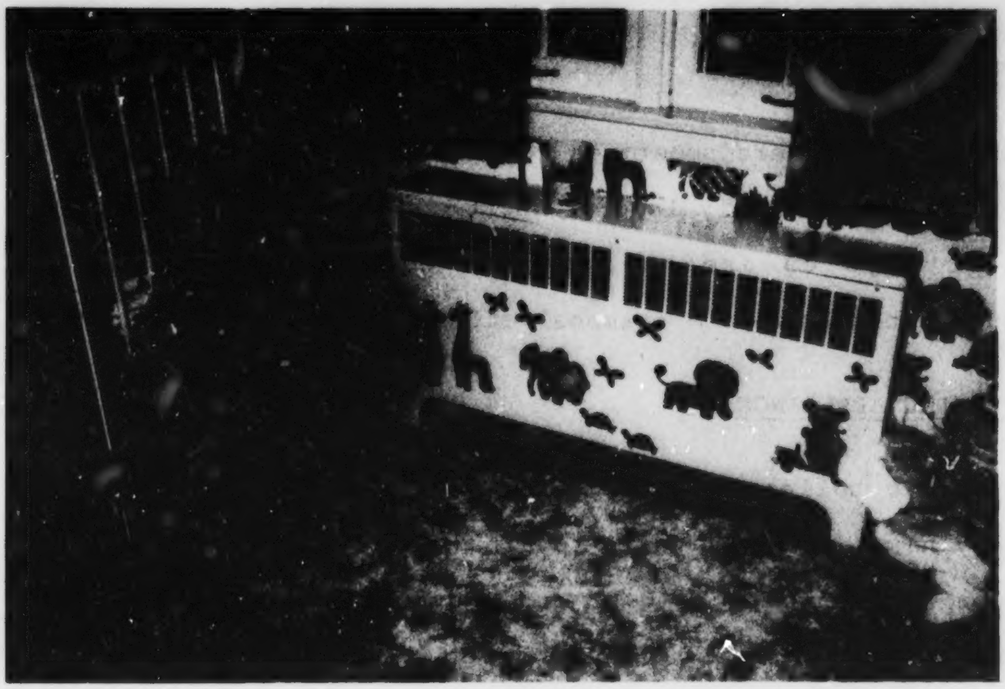
Most of the hydronicly heated houses had no wall insulation so a substantial amount of the heat that is given off by the rads, radiates into the cold wall to the outside. A comparison of the wall temperature behind a rad with the foil reflector and an adjacent rad without the reflector, dramatically proved the effectiveness of the foil. No actual wall temperature comparisons were done. However, the temperature



PLACING REFLECTIVE FOIL BEHIND RADS



PLACING REFLECTIVE FOIL BEHIND RADS



PLACING REFLECTIVE ALUMINUM FOIL BEHIND RADIATOR

PLACING REFLECTIVE ALUMINUM FOIL BEHIND RADIATOR difference was so great, that simply feeling the wall with a hand easily confirmed the foil's effectiveness.

THERMOSTATS

Anticipators were sometimes found to be incorrectly set, causing excessively long or short cycling of the boiler. Short cycles are hard on the equipment, and can substantially reduce seasonal efficiency.

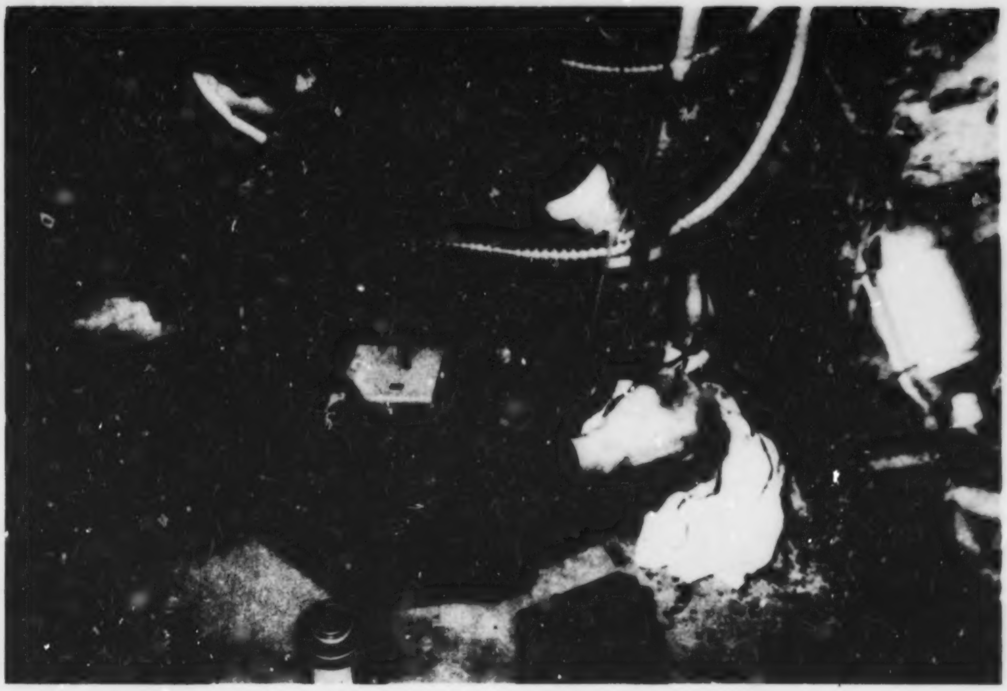
HEATING APPLIANCE

Electric boilers will only benefit from the tune-up if they have defective parts repaired. However, the actual repair cost would be over and above the normal tune-up cost. Most gas boilers showed little combustion efficiency improvements regardless of their age.

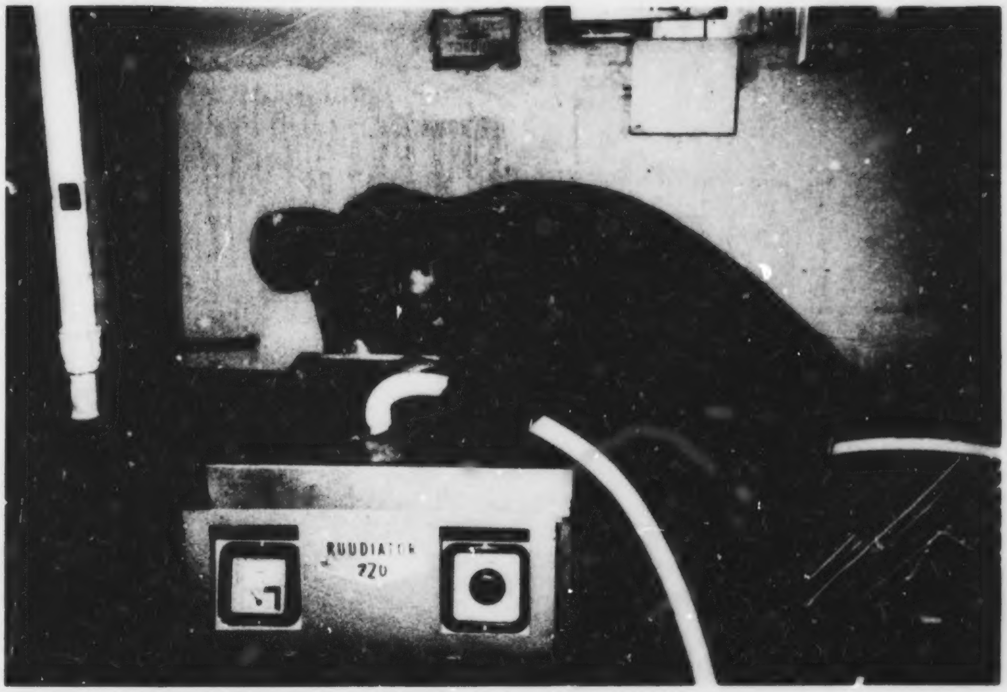
Oil boilers showed the greatest improvements. Older appliances benefited the most, but even the newer units required the tune-up to bring them to their optimum efficiency.

The newer (1-8 year) gas and oil boilers that we encountered appeared to require substantially more maintenance than the older boilers. Some of the newer boilers leave more heat exchanger surface area and less free space for the combustion gases to pass. Although this design may increase the boiler's efficiency, it appears to be very vulnerable to less than perfect

TUNE-UP WORK



CLEANING THE ELECTRODES OF AN OIL BURNER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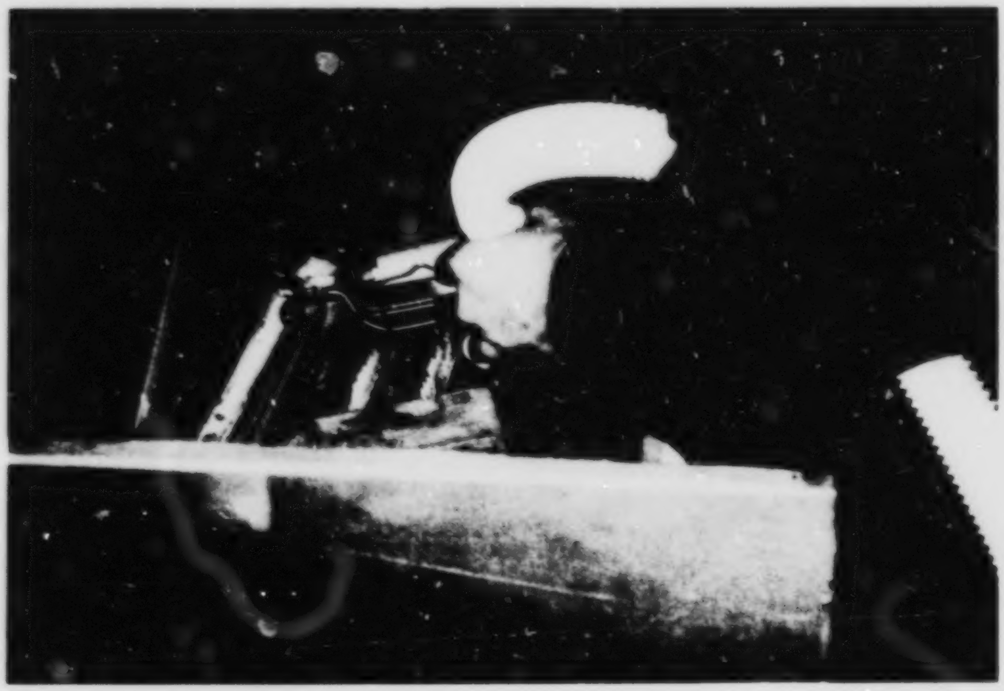
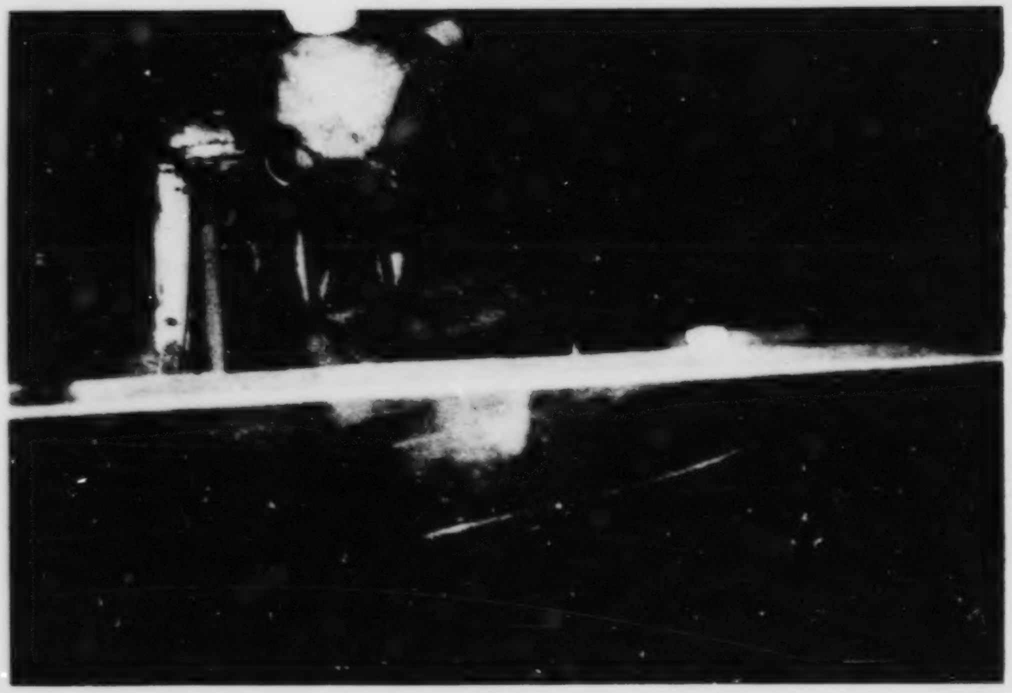
CLEANING HEAT EXCHANGER



CLEANING THE HEAT EXCHANGER



CLEANING THE HEAT EXCHANGER

installation, long periods between maintenance and oversizing.

Oversizing appeared to be capable of significantly reducing the life of some newer gas boilers. The standing pilot of one grossly oversized gas boiler had corroded away over half the fin area above the pilot flame. Since this unit was so oversized and, therefore, had short firing times, it probably never really warmed up and as a result, all of the fins on the back half of the heat exchanger were corroded to half size.

Older boilers, some over 100 years old, appear to have not only a much longer life than their modern replacements but are also less vulnerable to improper installation, while at the same time providing combustion efficiencies not all that much lower than the newer units. One oil-fired boiler that had an 18 foot horizontal flue run to the chimney, had its heat exchanger completely clog with soot. This prevented the combustion gases from escaping the combustion chamber, so a combustion chamber seam that was not welded or riveted, opened to allow the products of combustion to enter the house. For more information on this boiler, see the special report on House 14.

Most of the gas and oil boilers suffered from insufficient or inadequate maintenance. This lack of appropriate maintenance appeared to affect the newer boilers much more so than the older units.

HYDRONIC HOUSES

HOUSE #	1	2	3
HOUSE AGE	43	85	46
BOILER FUEL	gas	oil	oil
ADJ. ANTICIPATOR	none	no	no
CLOSED/OPEN SYST.	closed	closed	closed
RAD. TYPE	iron	iron	iron
BLEEDERS PRESENT	yes	yes	yes
BLED RADS	yes	yes	yes
CHIMNEY TYPE	masonry	masonry	masonry
CHIMNEY COND.	Not Access.	Not Access.	ok
BOILER MAKE	coal conversion	coal conv.	coal conv.
BOILER AGE	43	23	46
INPUT RATING kW	37	51	61.50
NOZEL B.F.	na	1.25	1.50
NOZEL AFT.	na	1.25	1.50
STACK TEMP.B.F., C.	170.6	256.7	222.2
STACK TEMP. AFT., C	170.6	256.7	222.2
% CHANGE	0.00	0.00	0
EFFICIENCY B.F.	82.50%	75.20%	70.00%
EFFICIENCY AFT.	82.50%	75.20%	78.00%
% CHANGE	0.00	0.00	11.43%
BOILER KWH BF	31	39	43
BOILER KWH AFT	31	39	ERR
% CHANGE	0.00	0.00	ERR
COMB. CHBR COND	ok	good	good
HEAT EX. COND.	clean	clean	average
EXCHGR CLEANED	no	no	yes
EXP. TANK RECHARGED	yes	yes	yes
WATER HTR FUEL	gas	electric	electric
OIL KWH/D.D. BF		12.03	12.91
OIL KWH/D.D. AFT		10.45	11.22
% CHANGE		-13.13%	-13.09%
GAS KWH/D.D. BF	10.58		
GAS KWH/D.D. AFT	9.99		
% CHANGE	-6.76%		
EL. KWH/D.D. BF			
EL. KWH/D.D. AFT			
% CHANGE			
RECOMMENDATIONS	set-back thermostat	Re-wire pump, outdoor cont., flue damper, conv. burner, new gas boiler, new thermostat.	pump to cont. run, flue damper, outdoor cont. gas conv. burner, new gas boiler.

HYDRONIC HOUSES

HOUSE #	4	5	6
HOUSE AGE	68	50	50
BOILER FUEL	oil	gas	oil
ADJ. ANTICIPATOR	no	no	yes
CLOSED/OPEN SYST.	closed	closed	closed
RAD. TYPE	iron	convectors	steel
BLEEDERS PRESENT	yes	yes	yes
BLED RADS	yes	no	ok
CHIMNEY TYPE	masonry	B	mas. w/o lnr
CHIMNEY COND.	Not Access.	ok	Not Access.
BOILER MAKE	coal conv.	Hi T Steel	Dominion Rad.
BOILER AGE	68	33	47
INPUT RATING kW	41	59	na
NOZEL B.F.	1.00	na	na
NOZEL AFT.	1.00	na	na
STACK TEMP.B.F., C.	185	140	444
STACK TEMP. AFT., C	185	127	444
% CHANGE	0.00%	-9.29%	0.00%
EFFICIENCY BEF.	76.00%	84.20%	66.00%
EFFICIENCY AFT.	76.00%	84.20%	66.00%
% CHANGE	0.00%	0.00%	0.00%
BOILER KWH BF	31	49	0
BOILER KWH AFT	31	49	0
% CHANGE	0.00	0.00	na
COMB. CHBR COND	good	poor	dirty
HEAT EX. COND.	average	plugged	good
EXCHGR CLEANED	no	yes	cleaned
EXP. TANK RECHARGED	no	ok	OK
WATER HTR FUEL	electric	gas	elect.
OIL KWH/D.D. BF			5.67
OIL KWH/D.D. AFT			5.58
% CHANGE			-1.53%
GAS KWH/D.D. BF		12.07	
GAS KWH/D.D. AFT		12.38	
% CHANGE		2.57%	
EL. KWH/D.D. BF			
EL. KWH/D.D. AFT			
% CHANGE			
RECOMMENDATIONS	baromet. damper, vent damper, outdoor cont..	reline comb. chamber, outdoor cont., conv. burner, new gas boiler.	more cleaning, repair stack control, outdoor cont., vent damper, conv. burner, new gas boiler.

HYDRONIC HOUSES

HOUSE #	7	8	9
HOUSE AGE	125	35	125
BOILER FUEL	oil	gas	electric
ADJ. ANTICIPATOR	yes	yes	no
CLOSED/OPEN SYST.	closed	closed	closed
RAD. TYPE	iron	iron	iron
BLEEDERS PRESENT	yes	yes	yes
BLED RADS	yes	no	yes
CHIMNEY TYPE	masonry	B Vent	na
CHIMNEY COND.	poor	OK	na
BOILER MAKE	Hydrotherm	Slant Fin	Chromalox
BOILER AGE	46	`2 mos.	1.5
INPUT RATING kW	51.3	29.3	20
NOZEL B.F.	1.25	na	na
NOZEL AFT.	1.25	na	na
STACK TEMP.B.F., C.	380.6	201	na
STACK TEMP. AFT., C	270.8	201	na
% CHANGE	-28.85%	0.00%	ERR
EFFICIENCY BEF.	75.00%	78.30%	100.00%
EFFICIENCY AFT.	78.00%	78.30%	100.00%
% CHANGE	4.00%	0.00%	0.00%
BOILER KWH BF	38	23	20
BOILER KWH AFT	40	23	20
% CHANGE	4.00%	0.00%	0.00%
COMB. CHBR COND	poor	good	na
HEAT EX. COND.	dirty	good	na
EXCHGR CLEANED	yes	no	na
EXP. TANK RECHARGED	no	ok	ok
WATER HTR FUEL	elect	gas 12/1983	electric
OIL KWH/D.D. BF	22.10		
OIL KWH/D.D. AFT	11.78		
% CHANGE	-46.69%		
GAS KWH/D.D. BF		11.69	
GAS KWH/D.D. AFT		10.37	
% CHANGE		-11.29%	
EL. KWH/D.D. BF			
EL. KWH/D.D. AFT			
% CHANGE			
RECOMMENDATIONS	line chimney, more cleaning, replace some rad valves, outdoor cont..	bigger bedroom rad outdoor cont., cont. run pump.	none

HYDRONIC HOUSES

HOUSE #	10	11	12
HOUSE AGE	100	33	86
BOILER FUEL	gas	gas	oil
ADJ. ANTICIPATOR	yes	no	yes
CLOSED/OPEN SYST.	closed	closed	closed
RAD. TYPE	iron	iron	iron
BLEEDERS PRESENT	yes	yes	yes
BLED RADS	yes	yes	yes
CHIMNEY TYPE	B	metal lnr	masonry
CHIMNEY COND.	OK	ok	poor
BOILER MAKE	Slant Fin	Gurney	?
BOILER AGE	4	33	86
INPUT RATING kW	23.1	58.6	41.0
NOZEL B.F.	na	na	1.00
NOZEL AFT.	na	na	1.00
STACK TEMP.B.F., C.	183.7	176	272.5
STACK TEMP. AFT., C	183.7	164	272.5
% CHANGE	0.00%	-6.82%	0.00%
EFFICIENCY BEF.	81.30%	81.90%	74.00%
EFFICIENCY AFT.	81.30%	83.00%	74.00%
% CHANGE	0.00%	1.34%	0.00%
BOILER KWH BF	19	48	30
BOILER KWH AFT	19	49	30
% CHANGE	0.00%	1.34%	0.00%
COMB. CHBR COND	?	poor	poor
HEAT EX. COND.	clean	dirty	dirty
EXCHGR CLEANED	OK	yes	yes
EXP. TANK RECHARGED	OK	ok	yes
WATER HTR FUEL	elect.	gas	elect.
OIL KWH/D.D. BF			16.53
OIL KWH/D.D. AFT			15.60
% CHANGE			-5.63%
GAS KWH/D.D. BF	5.75	10.77	
GAS KWH/D.D. AFT	4.01	8.36	
% CHANGE	-30.26%	-22.35%	
EL. KWH/D.D. BF			
EL. KWH/D.D. AFT			
% CHANGE			
RECOMMENDATIONS	new thermostat, setback thermostat replace pres. relief valve, outdoor cont..	thermostat, set-back therm., pipe insul., replace auto. bleeders, more cleaning, rebuild comb. chbr., new gas boiler.	chimney repairs, more cleaning, vent damper, outdoor cont., conv. burner, new gas boiler.

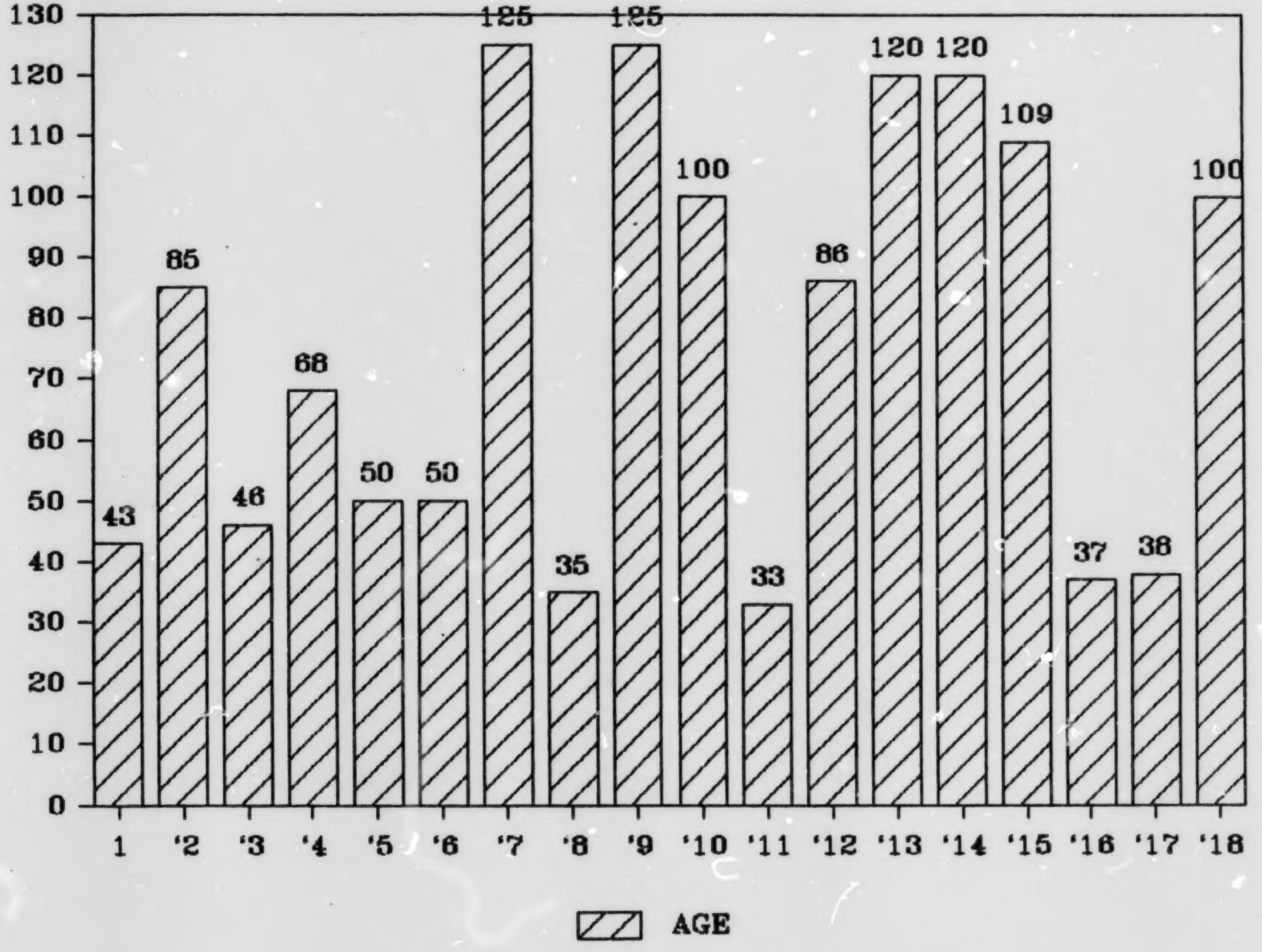
HYDRONIC HOUSES

HOUSE #	13	14	15
HOUSE AGE	120	120	109
BOILER FUEL	oil	oil	gas
ADJ. ANTICIPATOR	none	no	no
CLOSED/OPEN SYST.	closed	closed	closed
RAD. TYPE	iron	iron	iron
BLEEDERS PRESENT	yes	yes	yes
BLED RADS	yes	yes	yes
CHIMNEY TYPE	Mas. w/o lnr	masonry	asbest.pipe
CHIMNEY COND.	Not Access.	Not Access.	Not Access.
BOILER MAKE	Arco/Esso	Slant Fin	EMCO
BOILER AGE	120	6	28
INPUT RATING kW	na	38.7	na
NOZEL B.F.	na	na	na
NOZEL AFT.	na	na	na
STACK TEMP.B.F., C.	222	344	172
STACK TEMP. AFT., C	222	na	162
% CHANGE	0.00%	na	-5.81%
EFFICIENCY BEF.	72.00%	na	77.00%
EFFICIENCY AFT.	72.00%	na	79.00%
% CHANGE	0.00%	ERR	2.60%
BOILER KWH BF	na	na	na
BOILER KWH AFT	na	na	na
% CHANGE	na	na	na
COMB. CHBR COND	poor	dangerous	?
HEAT EX. COND.	average	blocked	dirty
EXCHGR CLEANED	yes	no	cleaned
EXP. TANK RECHARGED	yes	yes	yes
WATER HTR FUEL	elect.	elect.	gas
OIL KWH/D.D. BF	18.62		
OIL KWH/D.D. AFT	14.48		
% CHANGE	-22.20%		
GAS KWH/D.D. BF			5.53
GAS KWH/D.D. AFT			6.10
% CHANGE			10.32%
EL. KWH/D.D. BF			
EL. KWH/D.D. AFT			
% CHANGE			
RECOMMENDATIONS	new baro. damper, new auto-fill valve, rebuild comb. chbr, set back therm., new gas boiler.	Replace boiler	set-back therm., outdoor cont..

HYDRONIC HOUSES

HOUSE #	16	17	18
HOUSE AGE	37	38	100
BOILER FUEL	gas	elect.	oil
ADJ. ANTICIPATOR	yes	yes	no
CLOSED/OPEN SYST.	closed	closed	closed
RAD. TYPE	steel	iron	iron
BLEEDERS PRESENT	yes	yes	yes
BLED RADS	yes	yes	yes
CHIMNEY TYPE	B	na	masonry
CHIMNEY COND.	OK	na	?
BOILER MAKE	RUD 220	Chromalox	coal conv.
BOILER AGE	`6 plus	3	over 15
INPUT RATING kW	64.5	27.0	41.0
NOZEL B.F.	na	na	1.00
NOZEL AFT.	na	na	1.00
STACK TEMP.B.F., C.	244.2	na	397
STACK TEMP. AFT.,C.	222	na	397
% CHANGE	-9.09%	ERR	0.00%
EFFICIENCY BEF.	79.00%	100.00%	62.00%
EFFICIENCY AFT.	79.00%	100.00%	62.00%
% CHANGE	0.00	0.00%	0.00%
BOILER KWH BF	51	27	25
BOILER KWH AFT	51	27	25
% CHANGE	0.00%	0.00%	0.00%
COMB. CHBR COND	OK	na	dirty
HEAT EX. COND.	poor	na	dirty
EXCHGR CLEANED	yes	na	some
EXP. TANK RECHARGED	yes	OK	yes
WATER HTR FUEL	elect.	elect	electric
OIL KWH/D.D. BF			12.52
OIL KWH/D.D. AFT			16.80
% CHANGE			34.19%
GAS KWH/D.D. BF	11.89		
GAS KWH/D.D. AFT	9.67		
% CHANGE	-18.67%		
EL. KWH/D.D. BF		6.32	
EL. KWH/D.D. AFT		7.98	
% CHANGE		26.27%	
RECOMMENDATIONS	pump on cont. run, outdoor cont., new down-sized gas boiler.	none	Complete cleaning, new burner, vent damper, outdoor cont..

HOUSE AGES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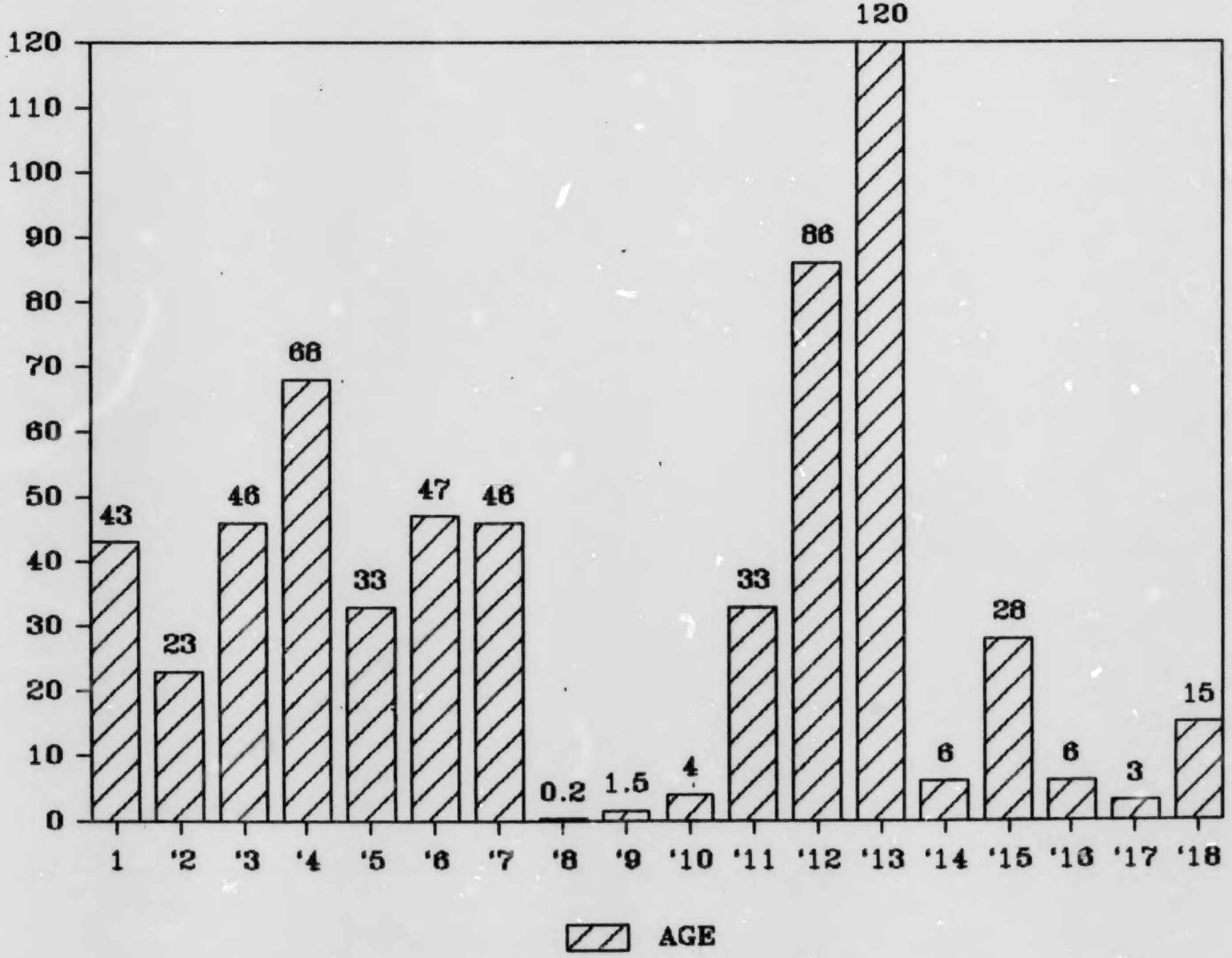
BOILER AGES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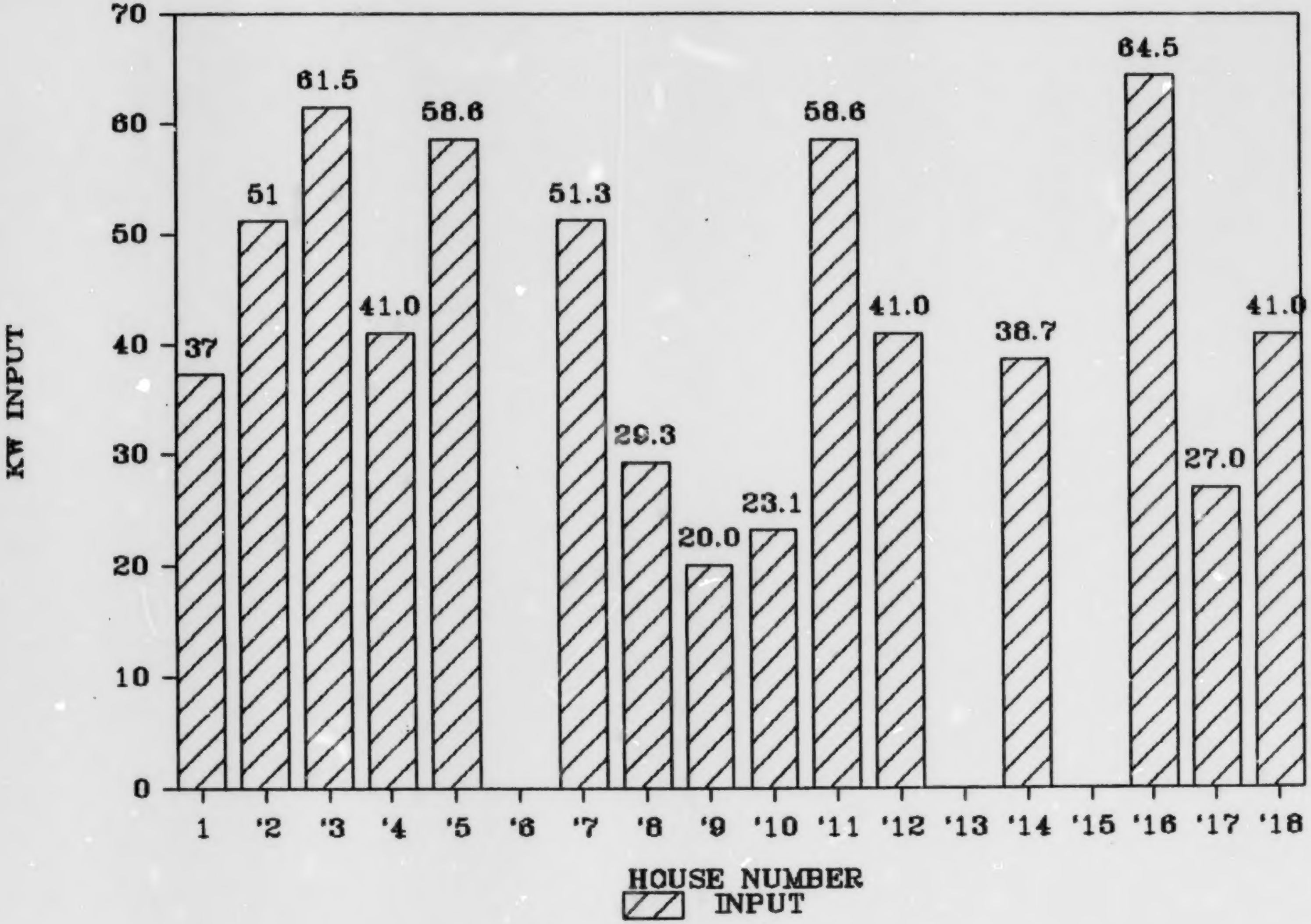
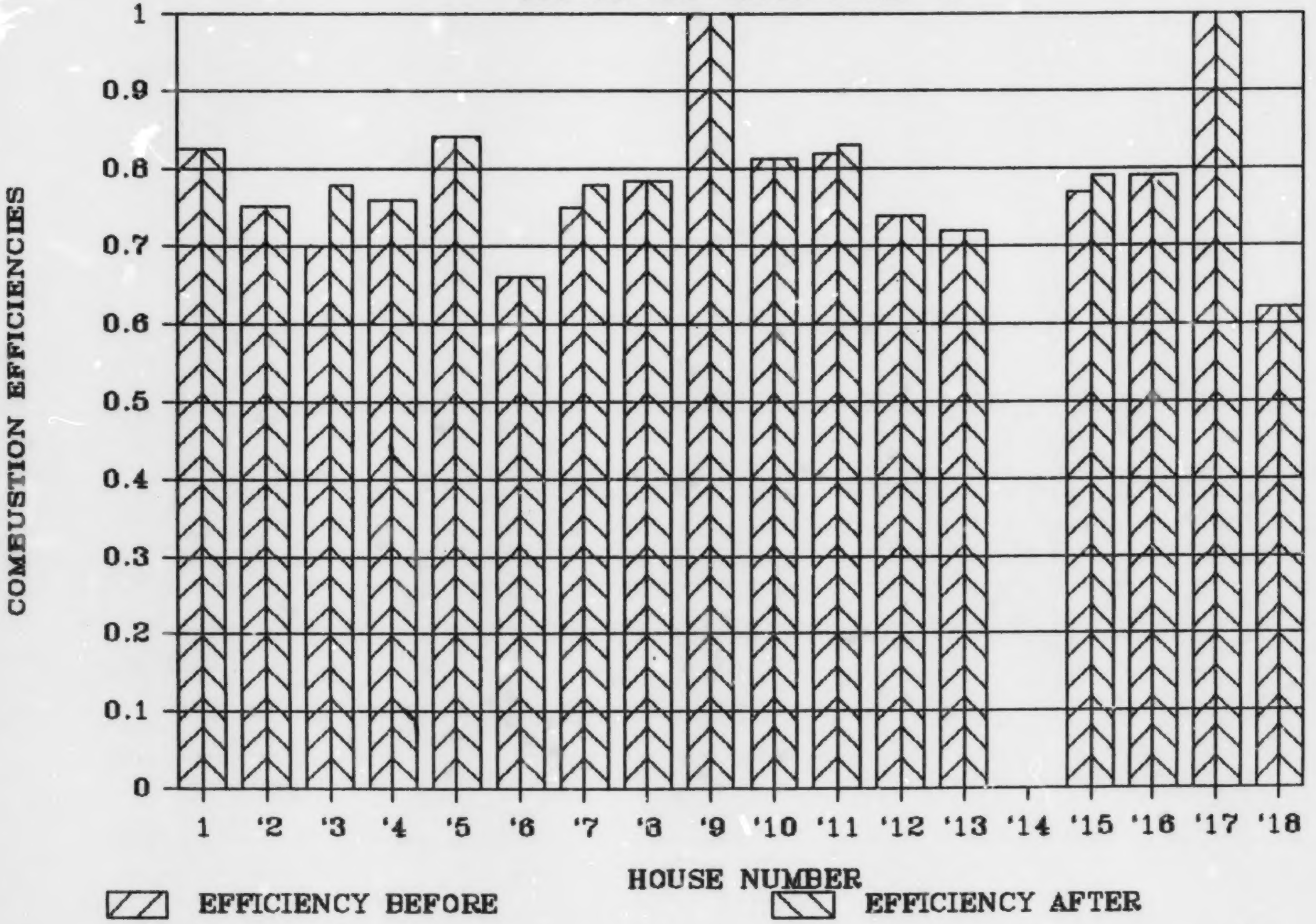
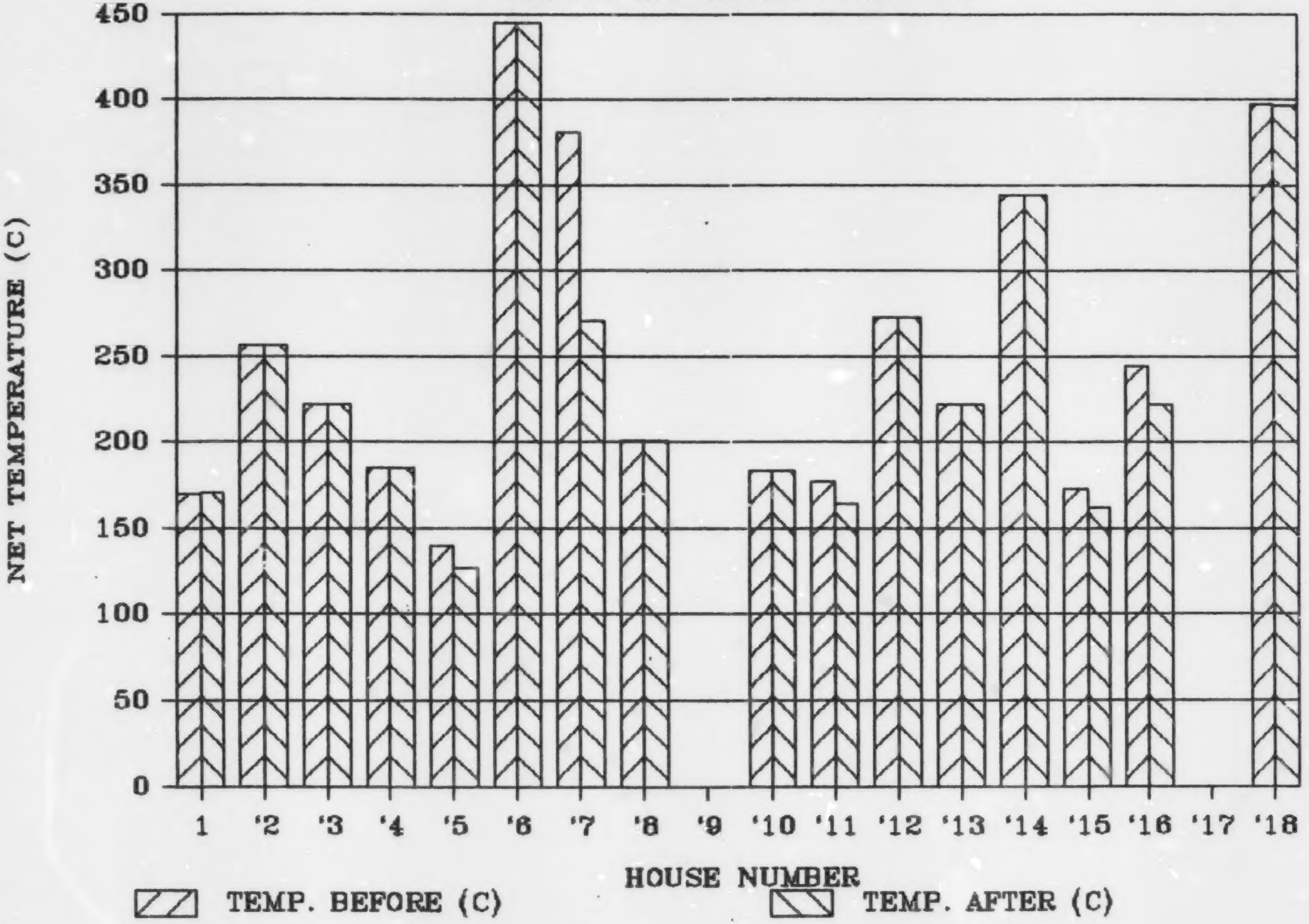


COMBUSTION EFFICIENCIES

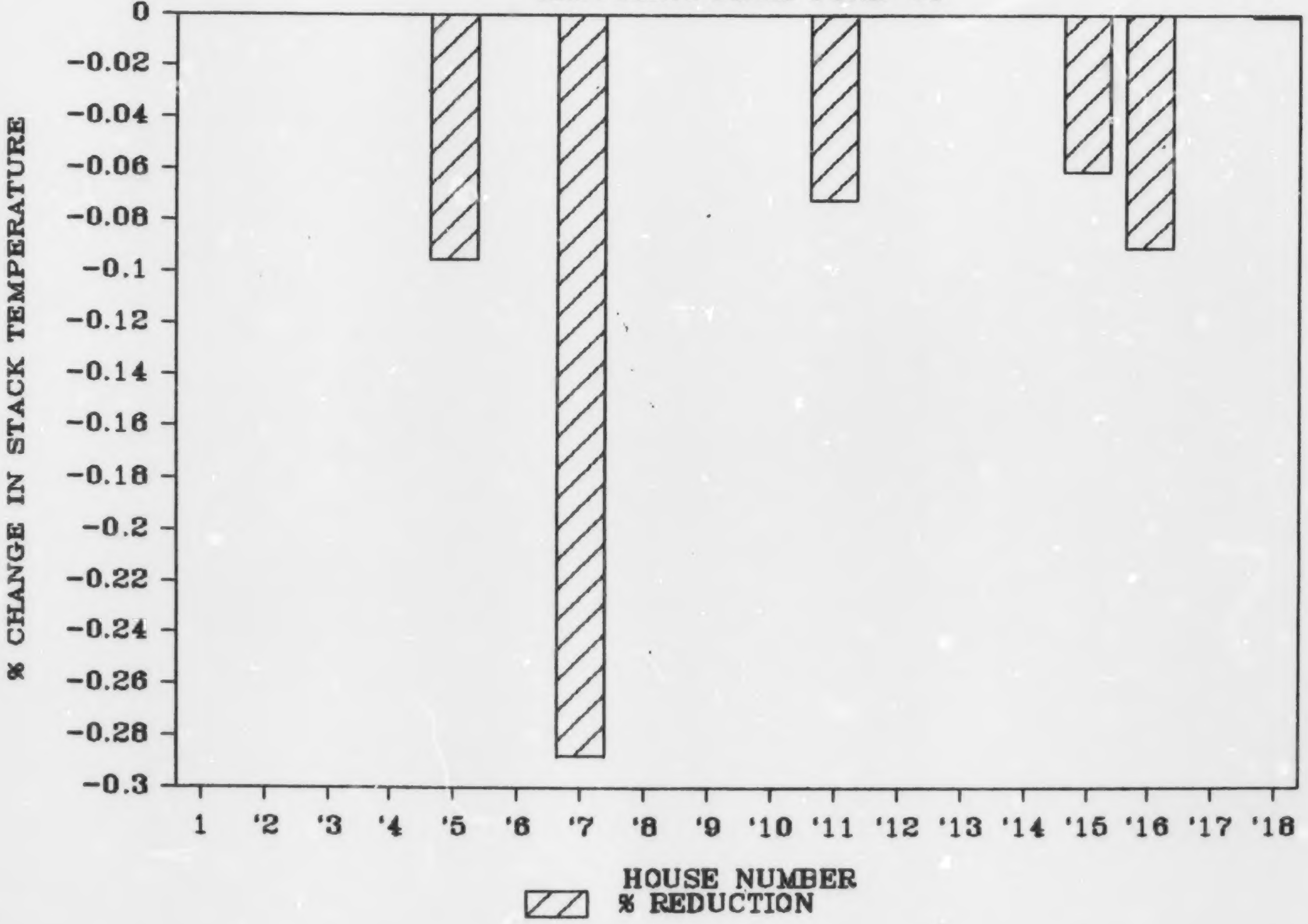
BEFORE AND AFTER TUNE-UP





NET STACK TEMPERATURES

BEFORE AND AFTER TUNE-UPS



NET STACK TEMPERATURE REDUCTIONS

RESULTING FROM TUNE-UP

MONITORING AND DATA COLLECTION

For the electric and gas heated homes, the service technician read and recorded the meter after the tune-up. These meters were read again after two or three weeks. Oil furnaces were monitored through receipt of oil bills.

Longer term monitoring will be conducted through the receipt of the next heating season's energy bills during Phase 2. This will provide a more accurate indication of the success of the tune-up in reducing energy consumption.

A degree day formula was applied to the heating bills covering the two heating seasons prior to the tune-up, to determine the amount of energy consumed to heat the house for one degree day. The same formula was applied to the amount of energy consumed after the tune-up, during a brief one to three month monitoring period, to ascertain whether or not less energy was now being consumed per degree day, as a result of the tune-up. Since the tune-ups were done during February, March and April, the fossil fueled heating systems were being monitored during their most inefficient time. (Short cycles)

ENERGY SAVINGS

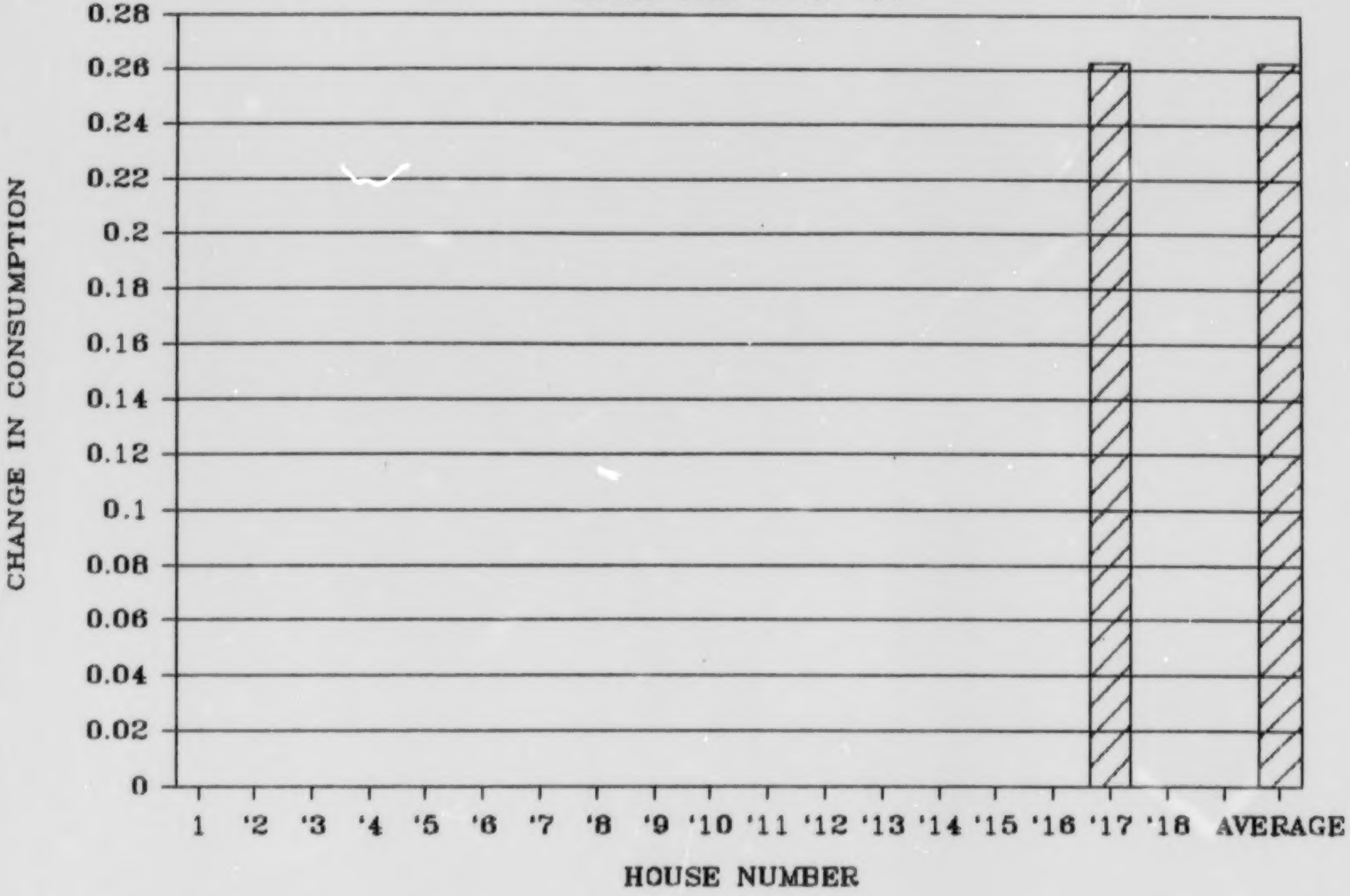
The short term monitoring that took place during the spring of 1984 indicated that the average gas boiler consumed 15% less fuel after the tune-up. The average reduction for the oil fired boilers was 17%. The energy bills were only available for one of the electric boilers and they showed an increase of 26% in consumption.

These changes in consumption following the tune-ups are substantially less than those achieved with forced air systems. The most likely reason is that there is little that can be done to improve the distribution system of hydronic systems, compared to forced air systems. Most of the savings have to come from improvements in combustion efficiency and heat transfer. Next seasons monitoring would probably show greater savings, because the reflectors that were put behind each radiator to reduce the amount of heat migrating to the outside through the wall, will save the most energy during the coldest winter months.

The following graphs show the change in the energy consumption of each house following the tune-up.

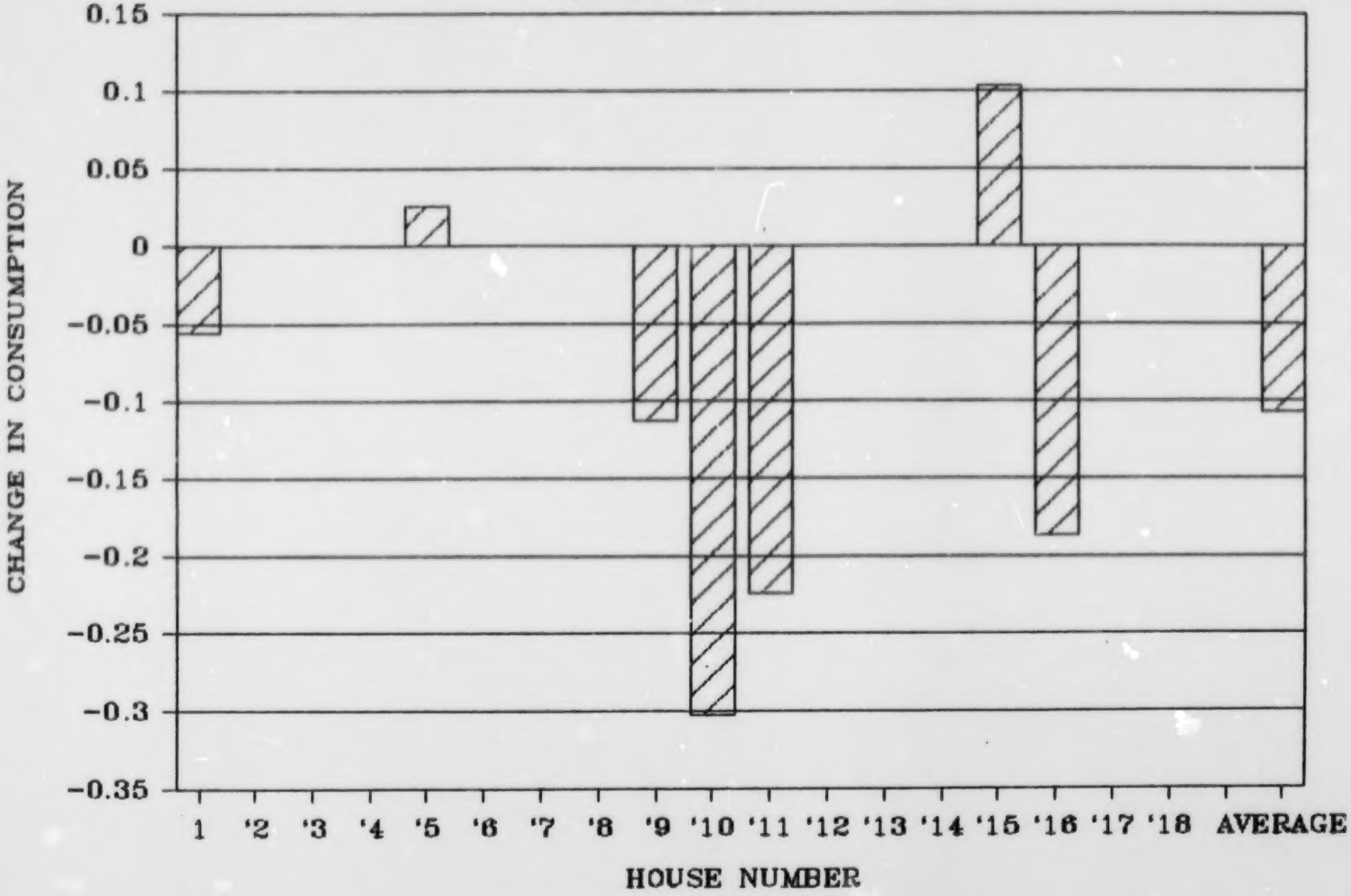
CHANGES IN ELECTRICAL CONSUMPTION

AFTER THE TUNE-UPS



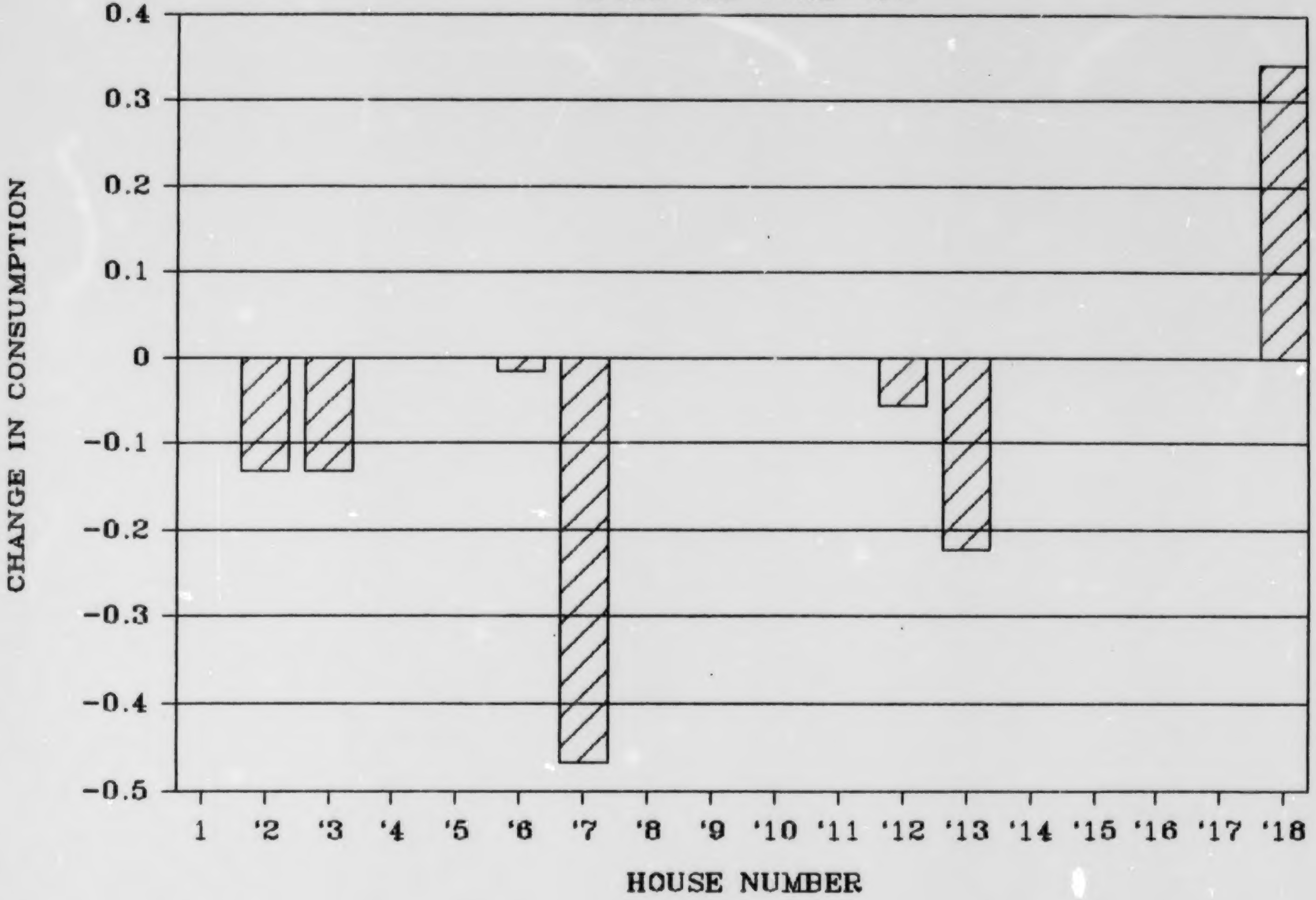
CHANGES IN GAS CONSUMPTION

AFTER THE TUNE-UPS



CHANGES IN OIL CONSUMPTION

AFTER THE TUNE-UPS



COMBUSTION AIR TEST RESULTS

The houses with a fossil fuel boiler were tested for sufficient combustion air. This test was done in most cases, while all exhaust fans, clothes dryers, and fireplaces (if operable) were in operation. The flue was then checked with the flue gas analyzer to ensure that there was a negative draft, indicating that the combustion gases were going up the chimney.

All of the houses, except one, appeared to have sufficient combustion air. This was not surprising, because a visual inspection of most of the houses found many cracks for air to enter, especially in the basement. In other words, none of the oil or gas heated houses appeared to be well sealed. One house had an open fireplace in an adjacent room, that prevented the boiler from getting sufficient draft until it warmed up. The owner was advised to open the window, beside the fireplace, slightly, whenthe fireplace is in use.

RETROFIT OPTIONS

The last stage of this project involved the development of retrofit options for those homes that could benefit from some kind of more substantial changes to their heating systems. Some of the houses offered no opportunity for any kind of practical or cost effective additional changes. Other houses would benefit from major changes and considerable capital outlay, with a good return on investment.

In those houses where the occupant does not now manually set back the thermostat, at night or during regular absences, and the occupants habits and personality might be condusive to set-backs, the addition of an automatic set-back thermostat was suggested. If the occupants already manually set back the thermostat, we did not suggest a set-back thermostat because there would be no savings and possible a slight increase in consumption.

Houses that were heated with oil, offered the greatest opportunity for further system improvements.

SUMMARY OF POSSIBLE RETROFITS & PAYBACK IN YEARS

House #	A Flue Damper	B Outdoor Controller	C High Effic. Burner	A + C	B + C	Gas Conv. Burner	Cond. Gas Boiler	Re-wire Circ. Pump	Insul. Pipes	Set-back Thermotstat
1										'(3 yrs)
2	'3.3 yrs	'2.5 yrs	'3.9 yrs	'5.2 yrs	'4.5 yrs	'2.1 yrs	'7.1 yrs	(p/b)		
3	'2.9 yrs	'2.5 yrs	'3.5 yrs	'4.7 yrs	'4.1 yrs	'(1.9 yrs)	'6.5 yrs	(p/b)		
4	p/b	p/b	p/b	p/b	p/b	p/b	p/b			
5		'(3.5 yrs)								
6	'6.8 yrs	'5.3 yrs	'8.2 yrs	'10.8 yrs	'9.4 yrs	'(4.9 yrs)	'14.3 yrs			
7	'2.5 yrs	'2 yrs	'3 yrs	'4 yrs	'(3.5 yrs)					
8		'(3.9 yrs)						'(p/b)		
9										
10		'5.6 yrs								'(4.3 yrs)
11							'13.4 yrs		'(p/b)	'(2.6 yrs)
12							'(5.3 yrs)			
13							'(5.0 yrs)			
14							'(p/b)			
15		'5.7 yrs								'(4.4 yrs)
16		'(3.7 yrs)						'(p/b)		
17									'(p/b)	
18	'2.6 yrs	'(2.4 yrs)	'3.2 yrs	'4.2 yrs	'3.7 yrs					

'( ) Recommended option. p/b Payback period unknown.

FINDINGS

The hydronic appliances were found to be in much worse condition than the forced air appliances that were part of the "Forced Air Total Tune-up Project". In many cases the heat exchanger cleaning that must be done would take longer than practical during any kind of a tune-up. The service technician often spent seven to eight hours on a single boiler and still felt that further cleaning was required. This means that in the period of a normal tune-up of a gas or oil boiler, it may not be possible to do sufficient cleaning to bring about a change in fuel consumption. The additional cleaning that would be necessary, over and above that which could be provided during two to three hour tune-up, would have to be considered a repair and be charged for separately just like any other necessary repair that is discovered during the course of a tune-up. Since the service technician spent so much time with the cleaning of each appliance during the field test, it is difficult to determine how long a typical hydronic **Total Tune-up** should be or the payback period.

REVIEW OF CHECK LISTS

After all the tune-ups were completed, the checklists were reviewed. The experience of this demonstration allowed us to improve on the checklist and develop one that would be used in the open market place. Several very experienced and knowledgeable contractors also reviewed the lists and offered some very good suggestions. The contractors that reviewed the list, did comment, that in order to put this program in place, an instruction book detailing the use and application of the checklists would have to be developed. This together with the information gathered could be presented to the industry in a series of seminars produced for the contractor's service personnel.

TUNE-UP TEST EQUIPMENT

To carry out the required tune-ups accurately and in a reasonable time, the technician must have an electronic flue gas analyzer. The application of other instruments are too inconsistant and often no two people will get the same readings with the mechanical analyzers.

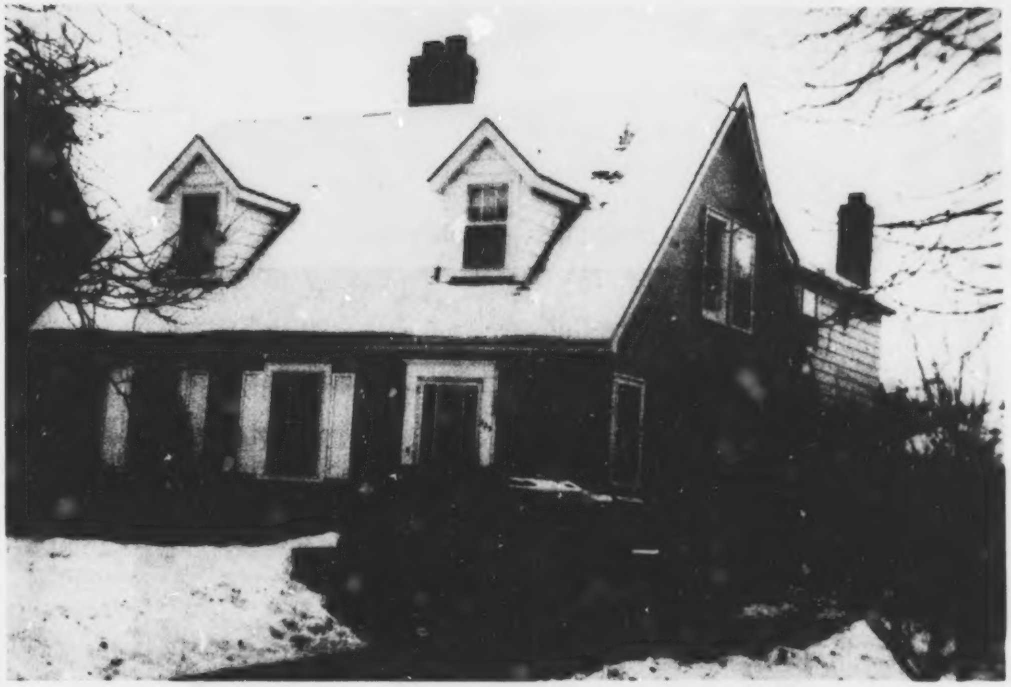
PART B

INDIVIDUAL HOUSE TUNE-UP EVALUATIONS

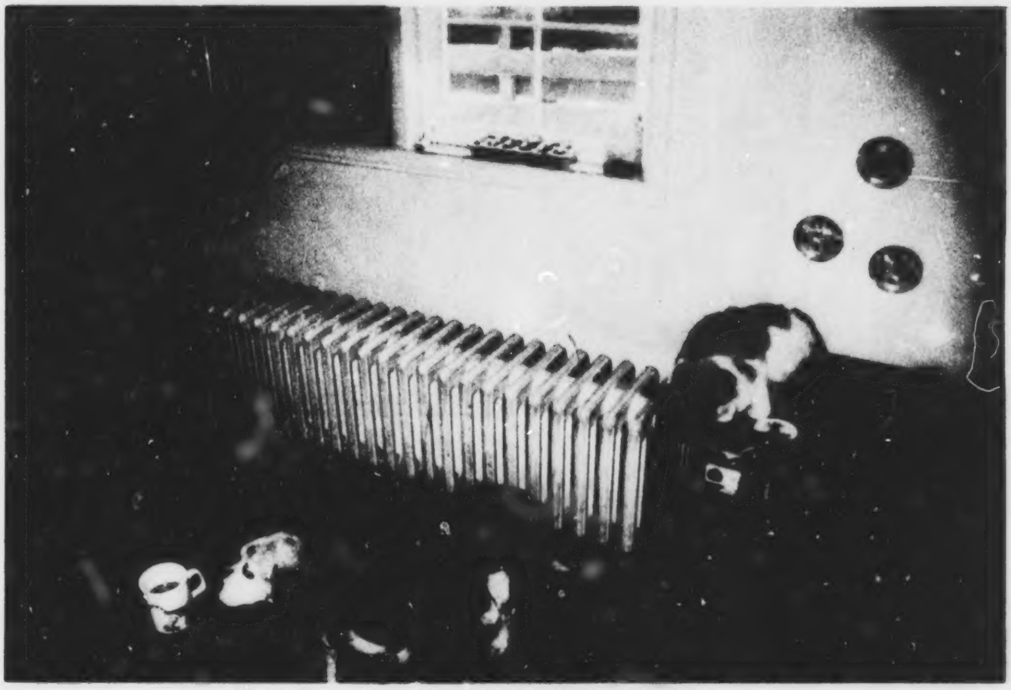
AND

POTENTIAL FURTHER SYSTEM IMPROVEMENTS

HOUSE 1



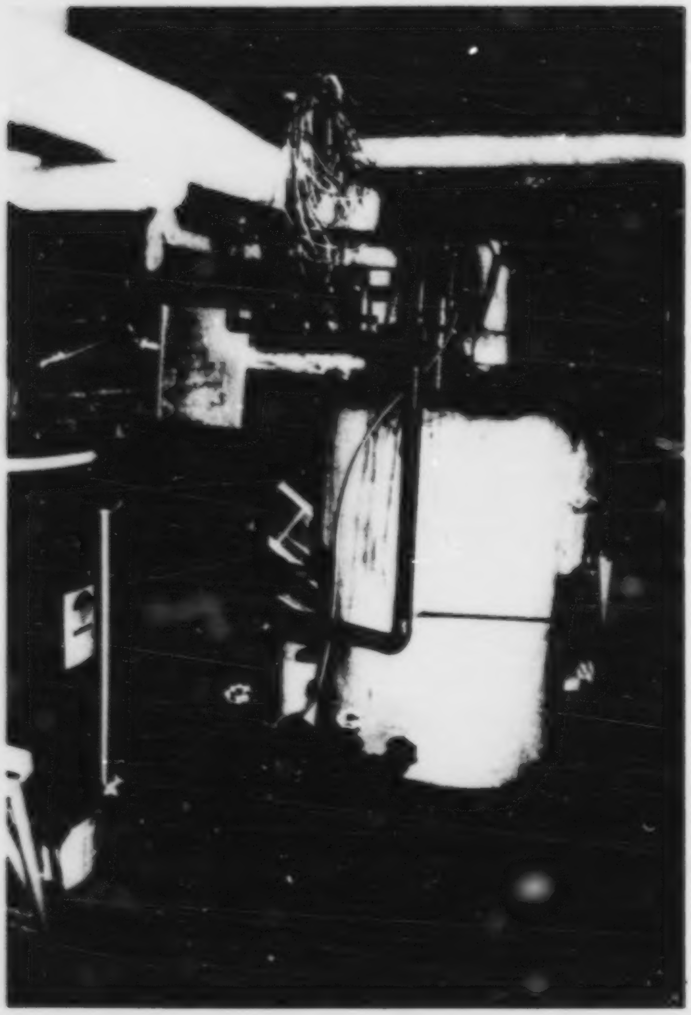
1½ STOREY HOUSE WITH 2 STOREY ADDITION



CAST IRON RADIATOR

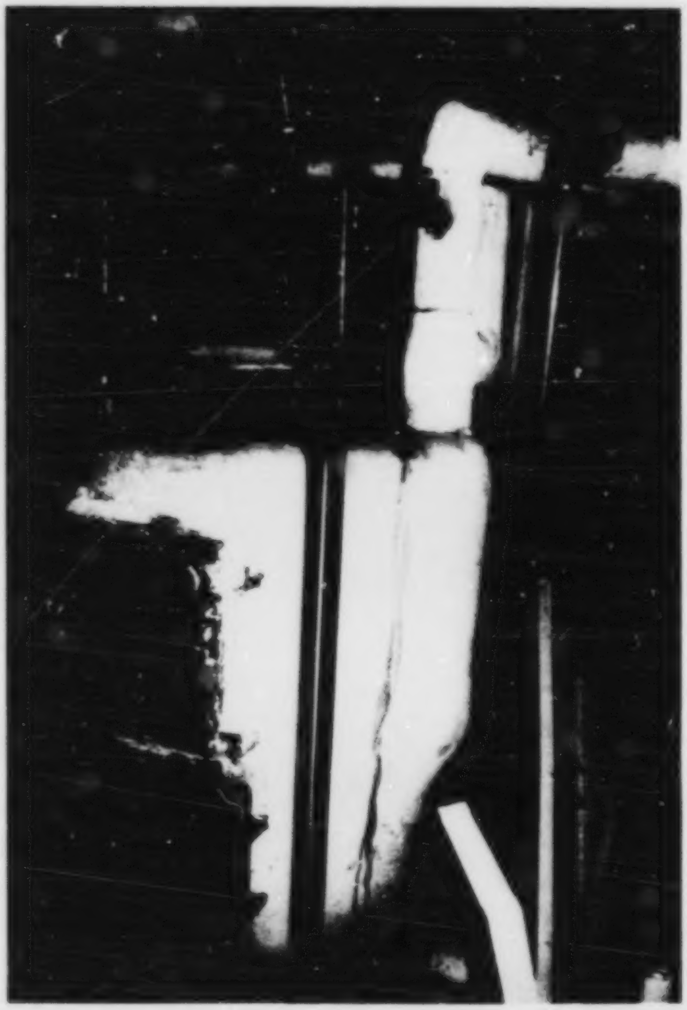
HOUSE 1

COAL BOILER CONVERTED TO GAS

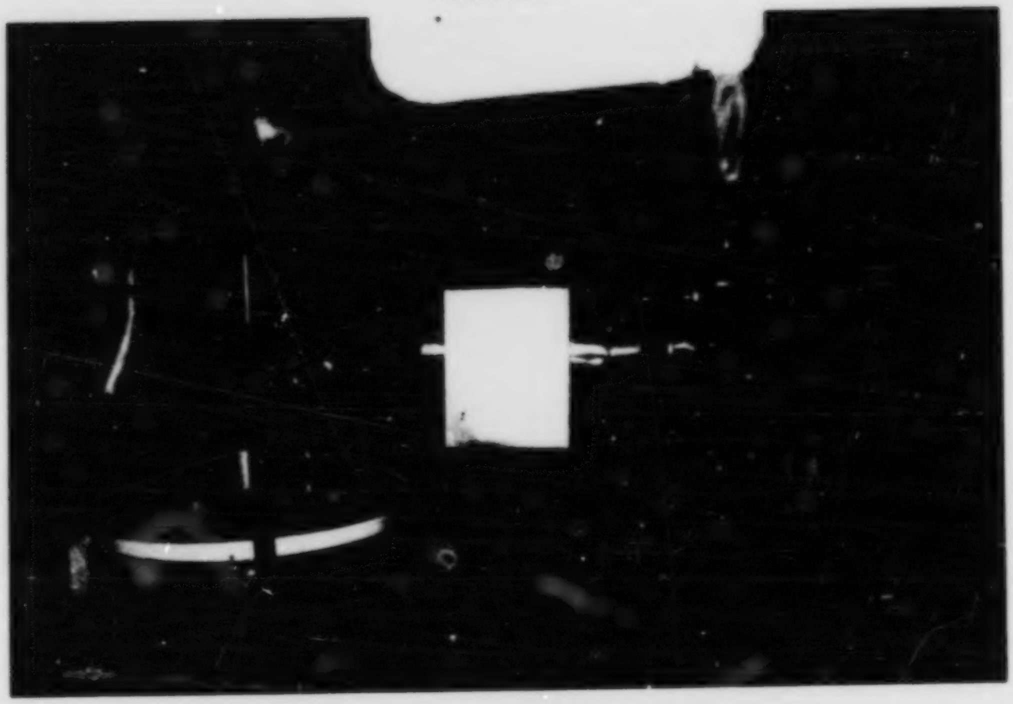


HOUSE 1

COAL BOILER CONVERTED TO GAS



HOUSE 1



DRAFT HOOD

HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 1 ENERGY SOURCE- Gas

BUILDING DESCRIPTION - TYPE 1½ storey with 2 storey addition

SIZE $232M^2$

INSULATION Walls = 0, ceiling R28

OCCUPANTS FAMILY SIZE 4

HABITS Leaves front door open for light

Doesn't alter thermostat settings

Opens windows when sleeping (winter)

COMFORT COMPLAINTS None

BOILER - TYPE Ideal APCO w/Robert Gordon Gas conv. burner

AGE 43 SYSTEM CONDITION

System in good condition

	BEFORE	AFTER
COMBUSTION TEST RESULTS -		
EFFICIENCY -	82.5	82.5
NET STACK TEMP -	170°C	170°C

COMMENTS Converted coal boiler

FUEL RECORD ANALYSIS Average kw/degree day before

tune-up = 10.58.

kw/degree day after tune-up = 8.77

Change in gas consumption since tune-ups = -17.07%

RETROFIT OPPORTUNITIES & COSTS

HOUSE 1

Cost of gas used for space heating last season was $1000.

Set-back Thermostat- The savings that will result from the installation of a set-back thermostat will vary with the amount and length of setback. Savings, based on a typical 5% reduction in gas consumption, would be $50./year. The installed cost is approximately $150., therefore the payback period would be 3 years.

HYDRONIC HOUSE # 1

Gas consumption for heating between Oct.4/82 and June 3/83 =

3444 M3 = 35645 kW

Applicable degree days = 3614

kW/degree day = 9.86

Gas consumption for heating between Oct 3/83 and April 2/84 =

3928 M3 = 40655 kW

Applicable degree days = 11.29

kW/degree day = 11.29

Average kW/degree day before tune-up = 10.58

Tune-up date - April 26/84 - Unfortunately the serviceman neglected reading the meter on that date.
Therefore, for the purpose of determining the consumption after the tune-up, the gas meter reading of April 2/84 was used and consumption to June 4th determined.

Gas consumed between April 2/84 and June 4/84 =

458.3 M3 = 4743.4 Kw

Applicable degree days = 540.8

kW/degree day = 8.77 after tuneup*

* Half of this monitored period falls before the tune-up so the actual kW/degree day could be significantly lower.

Change in gas consumption = -17.07%

HOUSE 2

HOUSE 2

CONVERTED COAL BOILER SHOWING CIRCULATING PUMP

HOUSE 2

COAL BOILER CONVERTED TO OIL

HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 2 ENERGY SOURCE- Oil

BUILDING DESCRIPTION - TYPE 2 Storey

SIZE 116 M^2

INSULATION Walls none, ceiling R28

OCCUPANTS FAMILY SIZE 2

HABITS Leaves thermostat alone
Opens bedroom windows at night
in winter

COMFORT COMPLAINTS None

BOILER - TYPE ARCO ideal w/ABC Burner

AGE 23+ SYSTEM CONDITION Good & Clean

	BEFORE	AFTER
COMBUSTION TEST RESULTS -		
EFFICIENCY -	75.2	75.2
NET STACK TEMP -	254°C	254°C

COMMENTS Upstairs rads kept turned off
Boiler is converted coal unit

FUEL RECORD ANALYSIS Average kw/degree day before tune-up = 12.03

kw/degree day after tune-up = 10.45

Change in oil consumption since tune-up = -13.11%

RETROFIT OPPORTUNITIES & COSTS

Cost of fuel oil last heating season was $1530.

A) **New Thermostat-** The approximate installed cost would be $100. Savings and payback period are indeterminable.

* B) **Rewire Circulating Pump To Be Thermosatically Controlled-** Cost would be approximately $50. Savings and payback are indeterminable.

C) **Flue Damper-** Installed cost would be approximately $450. Reduction in oil consumption would be approximately 9%, producing an annual saving of $138. Payback period would be 3.3 years.

D) **Outdoor Controller-** Installed cost would be approximately $350. Reduction in oil consumption would be approximately 9%, producing an annual saving of $138. Payback period 2.5 years.

E) **High Efficiency Oil Burner-** Approximate installed cost is $900. Savings would be approximately 15%, or $230 annually. Pay back period would be 3.9 years.

F) **High Efficiency Burner and Outdoor Controller-** Installed cost would be approximately $1250. Savings would be about 18%, or $275 annually. Payback period would be 4.5 years.

G) **High Efficiency Burner and Flue Damper-** Approximate cost is $1350. Expected savings are 17% or $260 annually. Payback period would be 5.2 years.

* H) **Gas Conversion Burner-** A gas conversion burner would provide a seasonal efficiency of 65% compared to the estimated 55% of the current system, therfore,the Kw input required would be 84.6% of the current system. Installed cost, including a chimney liner, would be approximately $1300. Since the current annual oil consumption is 4530 L (49053 kW), the new appliance would use 84.6% X 49053 kW (41506 kW) or 4010 M^3 of gas ,at a cost of $908. Savings would be $621 annually, providing a 2.1 year payback.

I) **Condensing Type Gas Boiler-** Cost would be approximately $6000 and the seasonal efficiency 90%. If the current seasonal efficiency is 55%, the kW input required to heat the house with the new boiler would be 61% of the current appliance's input. Current average annual oil consumption is 4530L (49053 kW). The new appliance would use .61 X 49053 kW, or 2896 M^3 of gas, at an annual cost of $685. Annual savings would be $845, providing a payback period of 7.1 years.

* Recommended Option

HYDRONIC HOUSE 2

Oil consumption between Nov. 6/81 and May 21/82 =

4499 L = 48724.17 kW

Applicable heating degree days = 3652
kW/degree day = 13.34

Oil consumption betwwen Nov. 10/82 and March 15/83 =

2380 L = 25775.4

Applicable heating degree days = 2406
kW/degree day = 10.71

Average kW/degree day before tune-up = 12.03

Tune-up date- April 27/84

Oil consumption between March 29/84 and May 21/84 =

518 L = 5610 kW

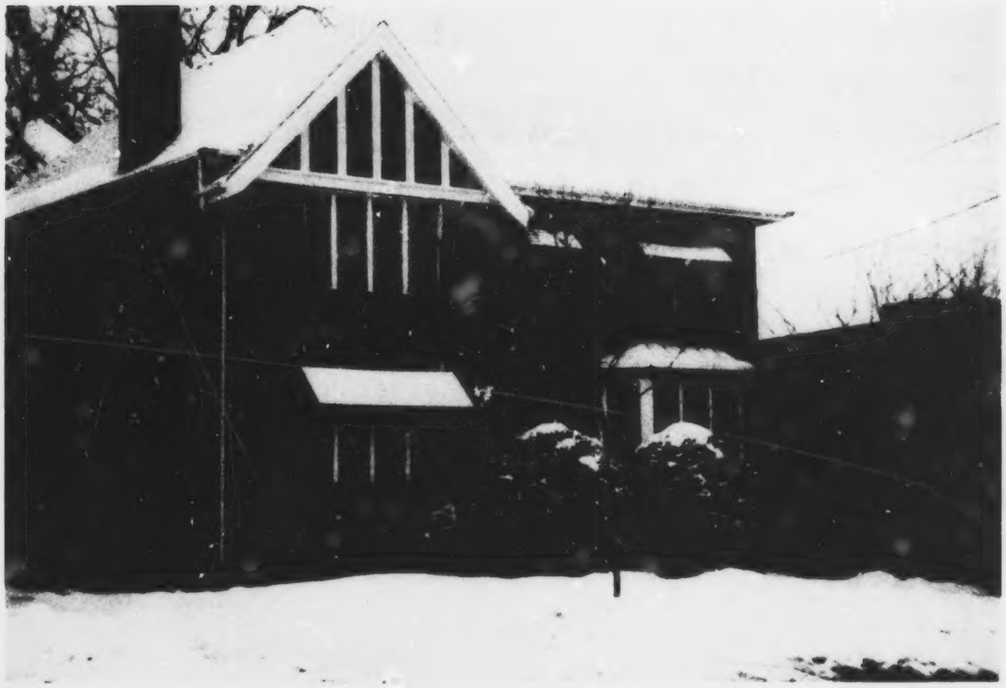
Applicable degree days = 536.6

kW/degree day = 10.45 *

* This applies to a time period that is 1/2 before and 1/2 after the tune-up, but for this purpose is considered to be after the tune-up.

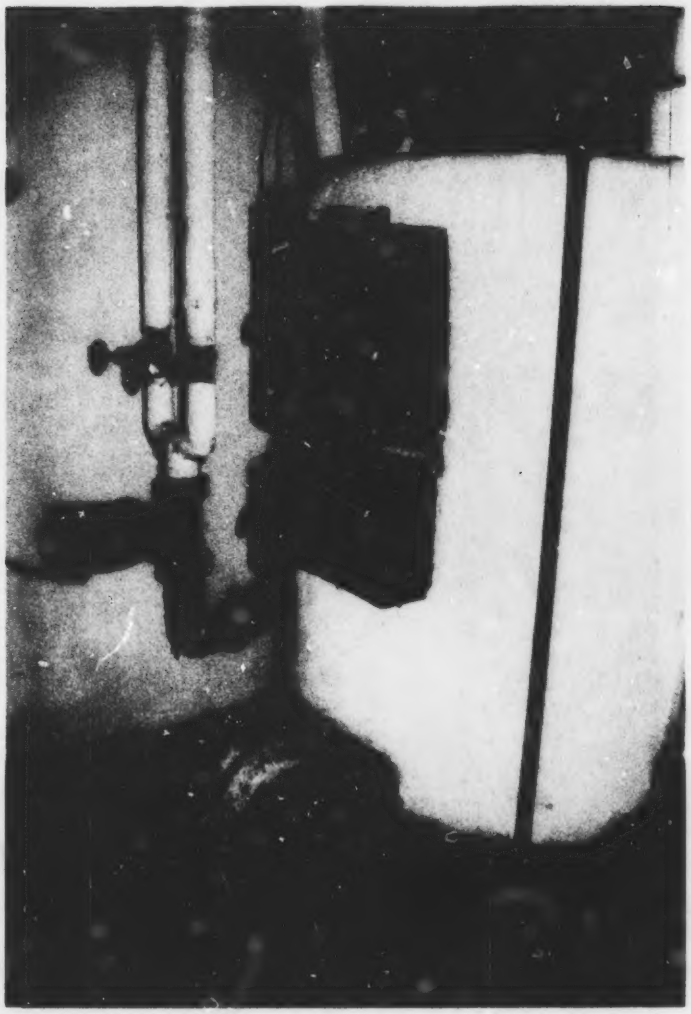
Changes in consumption resulting from tune-up = -13.11%

HOUSE 3



HOUSE 3

COAL BOILER CONVERTED TO OIL



HOUSE 3

COAL BOILER CONVERTED TO OIL

HOUSE 3

BURNER

HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 3 ENERGY SOURCE- Oil

BUILDING DESCRIPTION - TYPE 2 storey custom built

SIZE 242 M^2

INSULATION Walls none, ceiling R20-R28

OCCUPANTS FAMILY SIZE 7

HABITS Uses reflectors behind rads

COMFORT COMPLAINTS Dining room cool

BOILER - TYPE Gurney coal conversion unit

AGE 46 SYSTEM CONDITION Average

		BEFORE	AFTER
COMBUSTION TEST RESULTS	-		
EFFICIENCY	-	70%	78%
NET STACK TEMP	-	222	222

COMMENTS Burner cycling on limit. Pump cycling with stat. System should be changed to operate burner with stat and pump set to continuous run.

FUEL RECORD ANALYSIS Average kw/degree day before tune-up = 12.91

kw/degree day after tune-up = 11.22

Change in oil consumption since tune-up = -13.09%

RETROFIT OPPORTUNITIES & COSTS

Cost of fuel oil last heating season was $1700.

* A) **Change Circulating Pump To Continuous Run-** Cost would be $50. Payback period is indeterminable.

B) **Flue Damper-** The installed cost would be $450. Annual savings would be 9%, or $153, providing a payback period of 2.9 years.

C) **Outdoor Controller-** The installed cost would be $350. Savings would be 9%, or $153 per year, providing a 2.3 year payback.

D) **High Efficiency Oil Burner-** The installed cost would be approximately $900. Savings would be 15%, or $255 annually, providing a payback period of 3.5 years.

E) **High Efficiency Oil Burner and Outdoor Controller-** Installed cost would be approximately $1250. Savings should be 18%, or $306 annually, providing a payback period of 4.1 years.

F) **High Efficiency Burner and Flue Damper-** Installed cost would be $1350. Savings would be approximately 17%, or $289 annually, providing a 4.7 year payback period.

* G) **Gas Conversion Burner-** The installed cost, including a chimney liner, would be $1300. Currently 5090 L of oil (55123 kW) are consumed annually. The conversion burner would have a seasonal efficiency of 65% compared to 55% of the current system. This indicates that only 84.6% of the current kW (55123), or 46643 will be required. This represents 4507 M^3 of gas at a cost of $1021 annually, producing a savings of $679. Payback period would be 1.9 years.

H) **Condensing Gas Boiler-** The installed cost would be approximately $6000. The seasonal efficiency is 90% compared to 55% for the current boiler, therefore only 61% of the kW input would be required. The current average annual oil consumption is 5090L (55123 kW). The new appliance would require .61 X 55123 kW input (33680 kW) or 3254 M^3 of gas at a cost of $770. This would provide an annual savings of $930, for a payback period of 6.5 years.

* Recommended Option

HYDRONIC HOUSE 3

Oil consumption between June 2/82 and May 2/83 =

3961 L = 42898 kW

Applicable degree days = 3390

kW/degree day = 12.65 before tune-up.

Oil consumption between May 2/83 and March 5/84 =

3777 L = 40905 kW

Applicable degree days = 3105.5

kW/degree days = 13.17 before tune-up

Average kw/degree day before tune-up = 12.91

Oil consumption between March 5/84 and April 11/84 =

773 L = 8372 kW

Applicable degree days = 745.8

kW/degree day = 11.22 after tune-up *

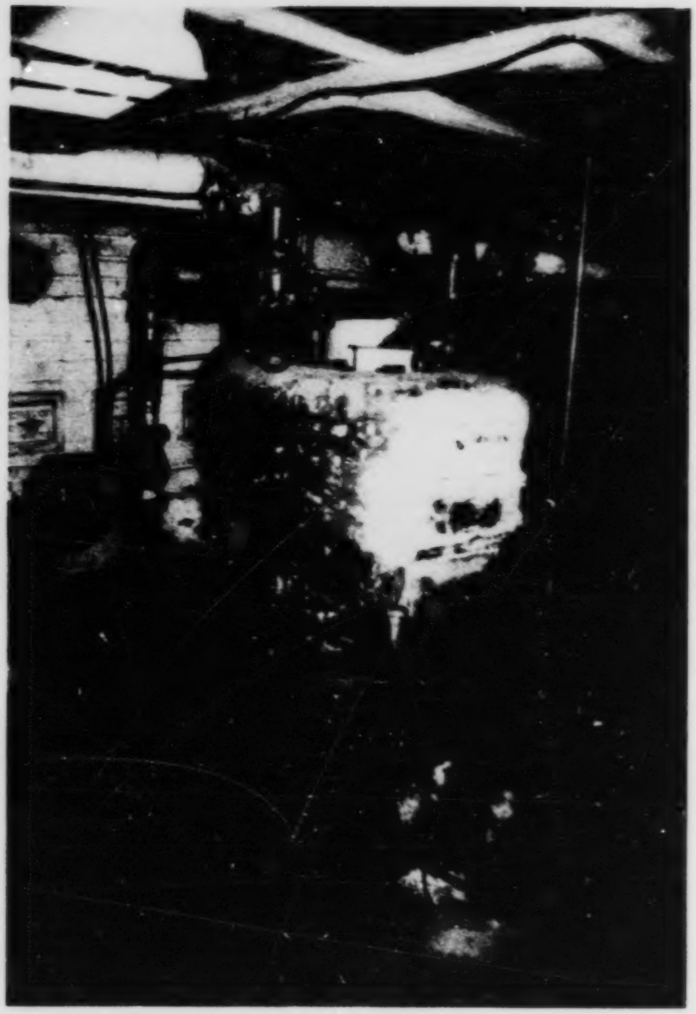
Reduction in oil consumption since the tune-up = -13.09%

* The tune-up was completed on March 23/84, therefore the after tune-up period is comprized of consumption that is half before and half after the tune-up.

HOUSE 4

HOUSE 4

COAL BOILER CONVERTED TO OIL



HOUSE 4

CENTRAL HUMIDIFICATION SYSTEM

HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 4 **ENERGY SOURCE-** Oil

BUILDING DESCRIPTION - TYPE 2 Storey brick

SIZE 3000 M^2

INSULATION Walls none, ceiling R20

OCCUPANTS **FAMILY SIZE** 2

HABITS Leaves thermostat alone

Opens bedroom window at night

COMFORT COMPLAINTS None

BOILER - TYPE Pease Foundry Converted Coal

AGE 68 **SYSTEM CONDITION** Average

	BEFORE	**AFTER**
COMBUSTION TEST RESULTS -		
EFFICIENCY -	76%	76%
NET STACK TEMP -	183	183

COMMENTS New barometric damper required

FUEL RECORD ANALYSIS Fuel bills not received from homeowner.

RETROFIT OPPORTUNITIES & COSTS

HOUSE 4

Annual oil consumption is unknown, as particpant has not yet submitted this information.

* A) **New Barometric Damper-** Installed cost is approximately $100.

B) **Flue Damper-** Installed cost is $450. Savings would be 9%.

C) **Outdoor Controller-** Cost is $350 and the savings would be 9%.

D) **High Efficiency Burner-** Cost is $900 and the savings would be 15%

E) **High Efficiency Burner and Outdoor Controller-** The installed cost is $1250 and the savings would be 18%.

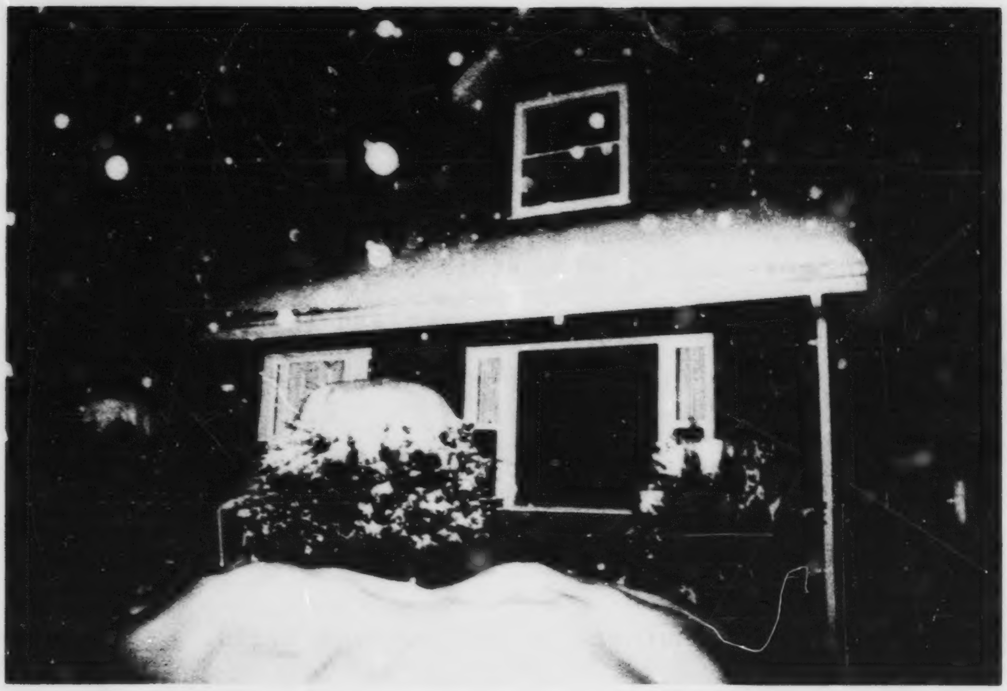
F) **High Efficiency Burner and Flue Damper-** Installed cost is $1350 and savings would be 17%.

G) **Gas Conversion Burner-** Installed cost $1300.

H) **Condensing Gas Boiler-** Installed cost is $6600.

* Recommended Repair

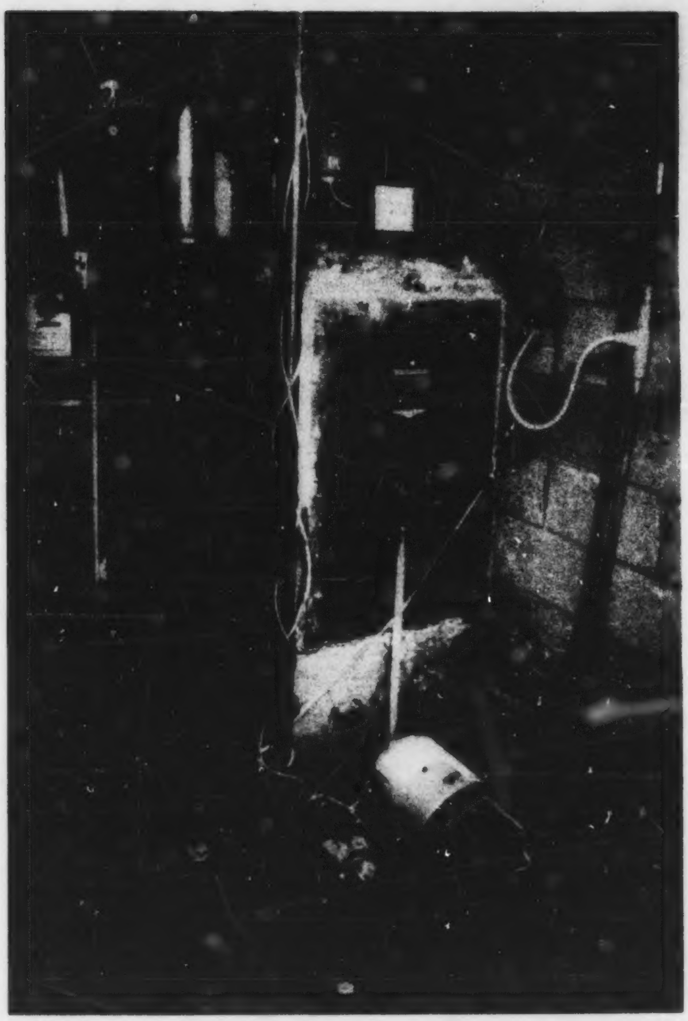
HOUSE 5



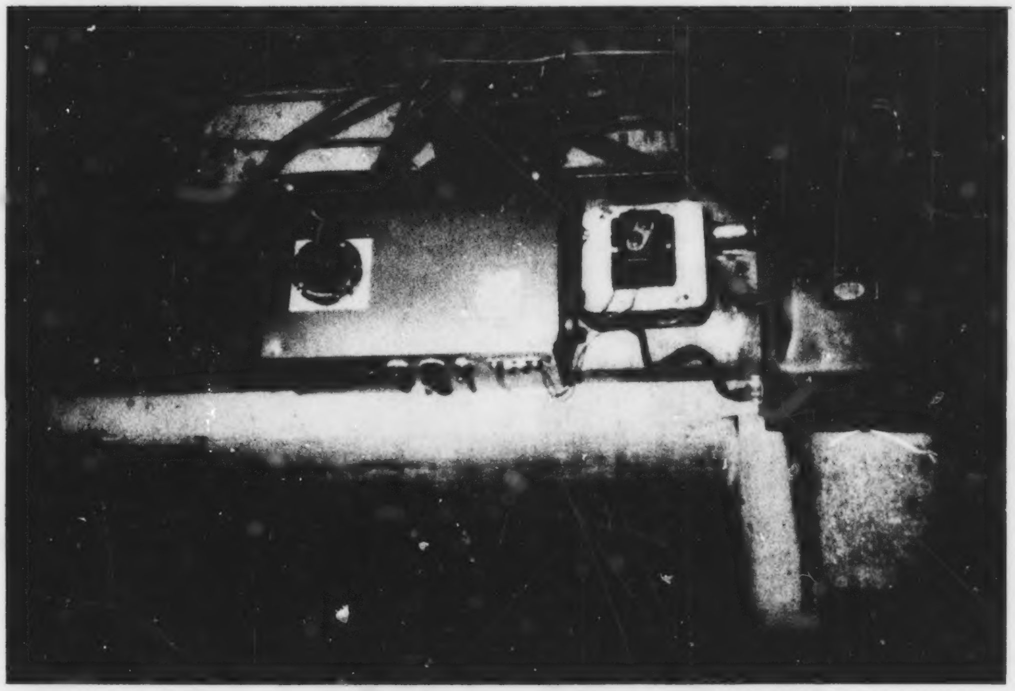
GAS CONVERTED BOILER

HOUSE 5

BOILER WITH GAS CONVERSION BURNER



HOUSE 5



CONTROL PANEL BUILT BY OWNER TO CONTROL CIRCULATION PUMP

HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 5 **ENERGY SOURCE-** Gas

BUILDING DESCRIPTION - TYPE Brick Storey and one half

SIZE 67 M^2

INSULATION Walls none, ceiling R28

OCCUPANTS **FAMILY SIZE** 2

HABITS Opens bedroom windows

COMFORT COMPLAINTS None

BOILER - TYPE Hi-T Steel Boiler - Oil Converted To Gas

AGE 33 Yrs. **SYSTEM CONDITION** Poor

	BEFORE	**AFTER**
COMBUSTION TEST RESULTS -		
EFFICIENCY -	84.2%	84.2%
NET STACK TEMP -	138.6	125.4

COMMENTS House overshoots temperature setting. Combustion chamber should be relined.

FUEL RECORD ANALYSIS Average kw/degree day before

tune-up = 12.07

kw/degree day after tune-up = 12.38

Change in gas consumption since tune-up = +2.57%

RETROFIT OPPORTUNITIES & COSTS

HOUSE 5

Cost of annual gas consumption for space heating is $1100.

A) **Re-line Combustion Chamber-** Cost unknown.

B) **Outdoor Controller-** The cost is $350 and savings of 9%, or $99 could be expected. Payback period would be 3.5 years.

HYDRONIC HOUSE 5

Gas consumption between Dec. 2/82 and June 2/83 = 3567 M3

Less gas used for hot water = 224 M3 = 3343 M3

= 34600 kW

Applicable degree days = 2907.9

kw/degree days = 11.90

Gas consumption between Aug. 4/83 and Nov. 30/83 = 1126 M3

Less gas used for hot water heating = 152 974 M3

= 10080.9 kW

Applicable degree days = 823.5

kW/degree day = 12.24

Average kW/degree day before tune-up = 12.07

Tune-up date - Feb. 22/84

Gas consumption between Feb. 1/84 and May 10/84 =

2142.9 M3 Less 125.5 M3 used for hot water =

2016.4 M3 = 20869 kW

Applicable degree days = 1685.8

kW/degree day = 12.38 after tune-up

Change in gas consumption for space heating since tune-up =

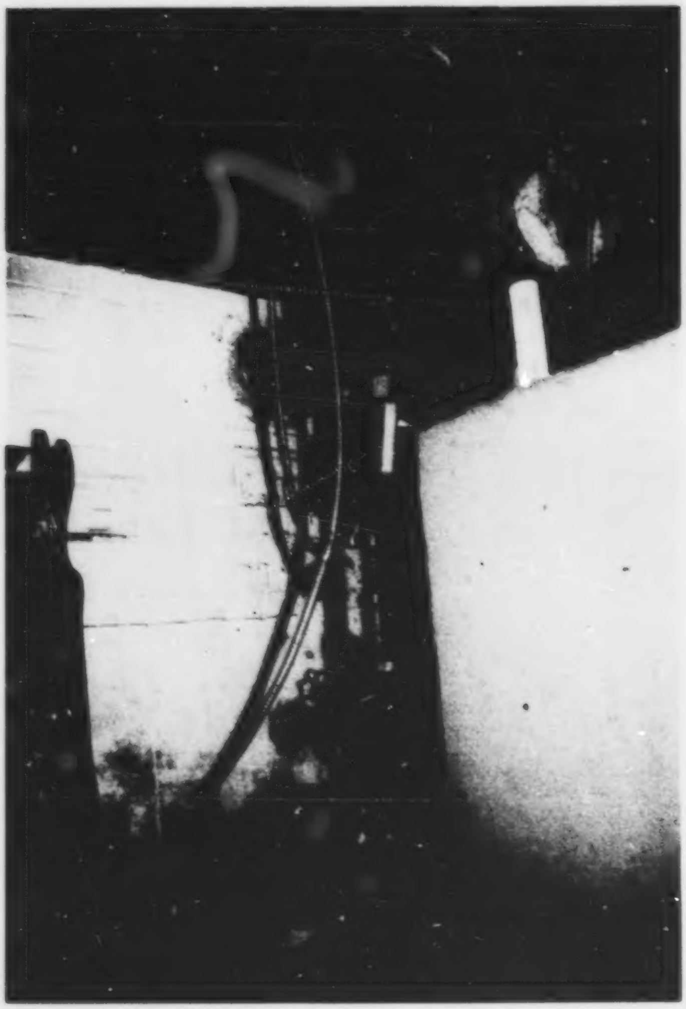
2.57%

HOUSE 6

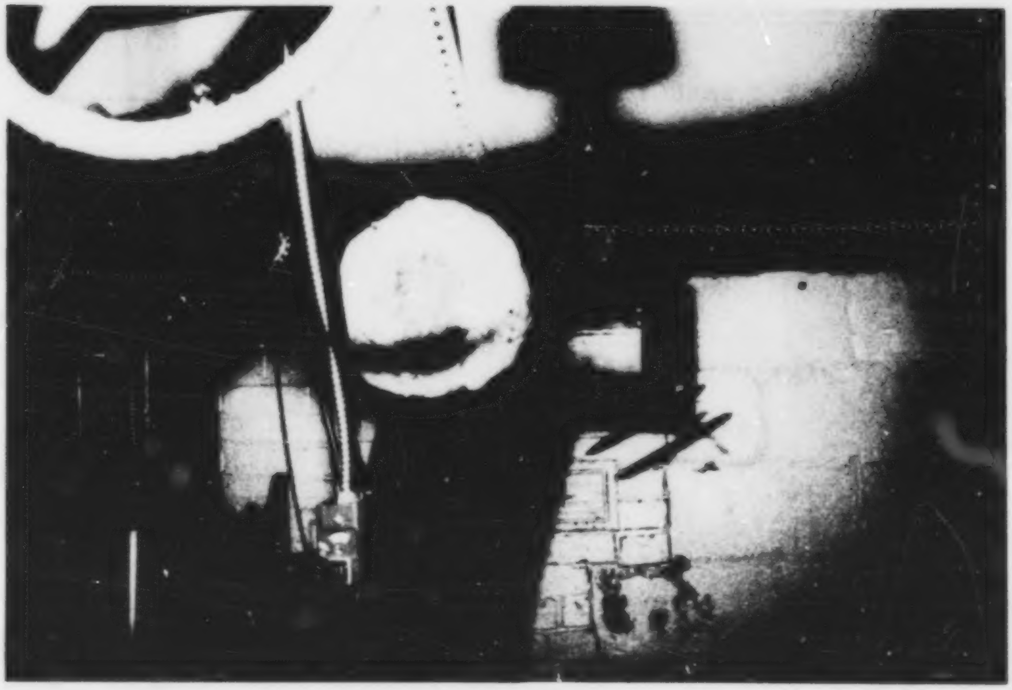
COAL BOILER CONVERTED TO OIL

HOUSE 6

CIRCULATING PUMP



HOUSE 6



BAROMETRIC DAMPER

CIRCULATING PUMP

HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 6 **ENERGY SOURCE-** Oil

BUILDING DESCRIPTION - TYPE 1½ storey

SIZE 111 M^2

INSULATION Walls none, attic R28

OCCUPANTS **FAMILY SIZE** 2

HABITS Leaves thermostat at one setting

COMFORT COMPLAINTS Basement cold

BOILER - TYPE Dominion radiator - coal converted

AGE 47 **SYSTEM CONDITION** Heat exchanger dirty - Requires more extensive cleaning - Furnace requires major repairs/cleaning - stack control not working properly

	BEFORE	AFTER
COMBUSTION TEST RESULTS -		
EFFICIENCY -	66	66
NET STACK TEMP -	440°C	440°C

COMMENTS Boiler is in such poorly maintained condition that even spending one whole day on the unit, was insufficient to produce immediately noticeable improvements.

FUEL RECORD ANALYSIS Average kw/degree day before tune-up

= 5.67

kw/degree day after tune-up = 5.58

Change in oil consumption since tune-up = -1.53%

RETROFIT OPPORTUNITIES & COSTS

HOUSE 6

Annual oil consumption is $735.

* A) **Further Heat Exchanger Cleaning-** Cost is approximately $110. Payback period is indeterminable.

* B) **Repair Stack Control-** Cost unknown.

C) **Flue Damper-** The cost would be $450 and it would provide savings of 9%, or $66., for a payback period of 6.8 years.

D) **Outdoor Controller-** Cost is $350 and savings would be 9%, or $66, providing a 5.3 year payback period.

E) **High Efficiency Burner-** Cost is $900 and savings would be 15%, or $110, providing a payback period of 8.2 years.

F) **High Efficiency Burner and Outdoor Controller-** Cost is $1250 and savings would be 18%, or $132, providing a payback period of 9.4 years.

G) **High Efficiency Boiler and a Flue Damper-** Cost is $1350 and savings would be 17%, providing a payback period of 10.8 years.

* H) **Gas conversion Burner-** Installed cost, including a flue liner would be $1300. The seasonal efficiency of the conversion burner would be 65% compared to 45% of the current oil system and will therefore require only 69% of the oil burner's kW input. Oil consumed annually is 2200L (23826 kW) and .69 X 23826 kW, or 1588 M^3 of gas at a cost of $471, would be required annually by the conversion burner. This is a savings of $264, providing a payback period of 4.9 years.

I) **Condensing Gas Boiler-** The installed cost would be approximately $6000 and the seasonal efficiency would be 90% versus 45% for the existing system. Since the current system used 2200 L of oil (23826 kW) the new appliance would require only 50%, or 11913 kW input. This is the equivalent to 1151 M^3 of gas, costing $314. Savings would be $421 annually, providing a payback period of 14.3 Years.

* Recommended Repair Or Option

HYDRONIC HOUSE 6

Oil consumption for the 1981/1982 heating season =

2152 L = 23306.16 kW

Applicable degree days = 5000

kW/degree day = 4.66

Oil consumption for the 1982/1983 heating season =

2085 L = 22580.55 kW

Applicable degree days = 3580

kW/degree day = 6.31

Oil consumption between Nov. 4/83 and Dec. 27/84 =

592 L = 6411.36 kW

Applicable degree days = 1007.8

kW/degree day = 6.36

Average kW/degree day before tune-up = 5.67

Tune-up date = Feb.20/84

Oil consumption between Feb. 27/84 and April 17/84 =

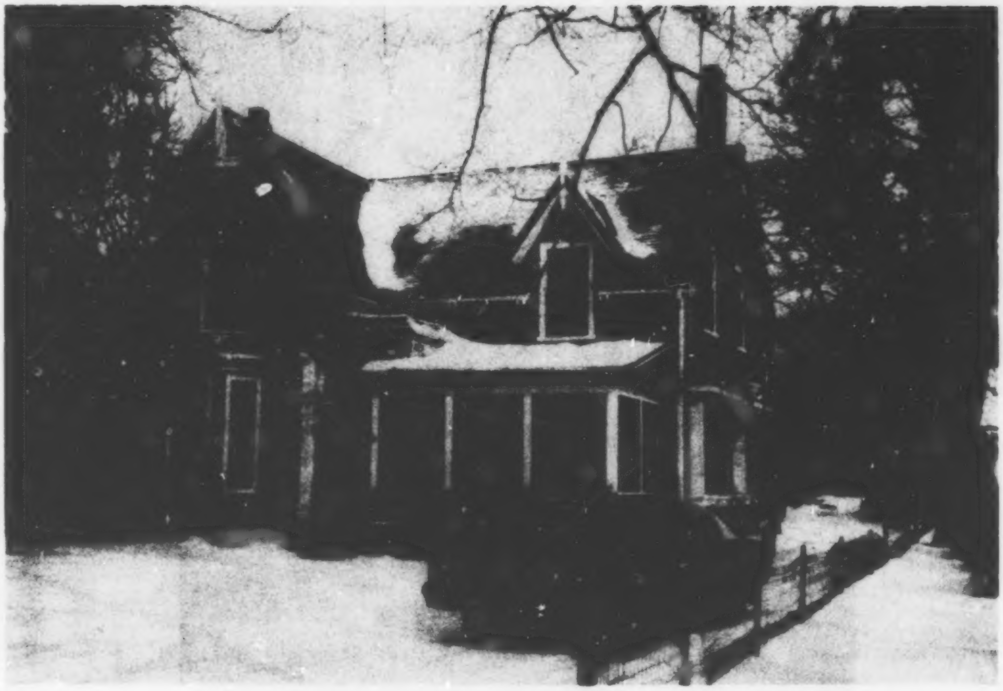
632 L = 6844.6 kW

Applicable degree days = 1226

kW/degree day = 5.58

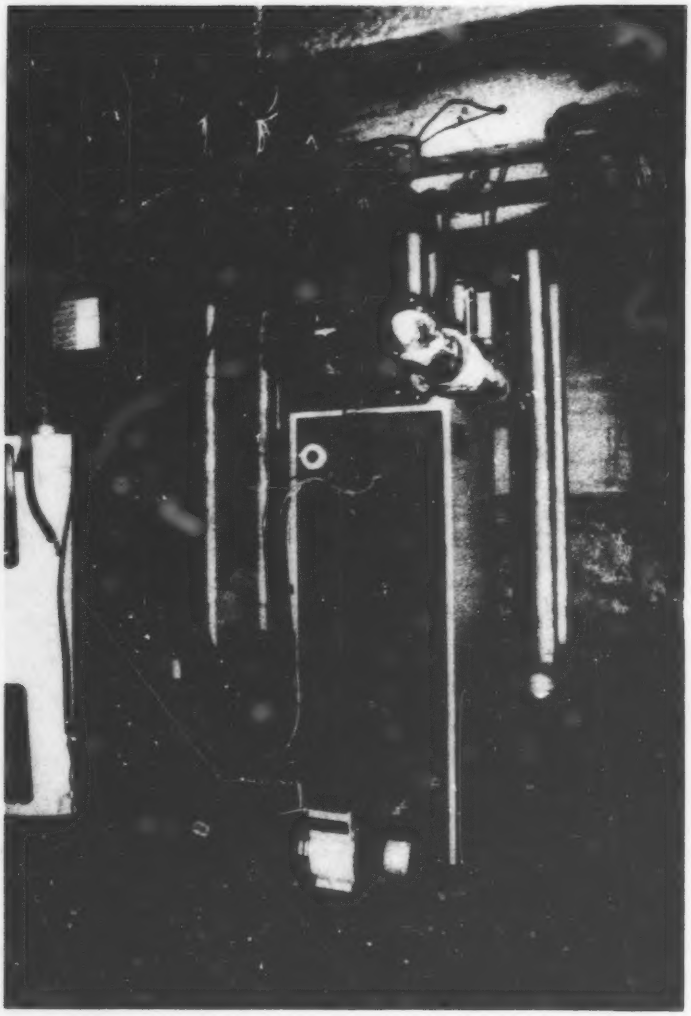
Reduction in oil consumption since the tune-up = -1.53%

HOUSE 7



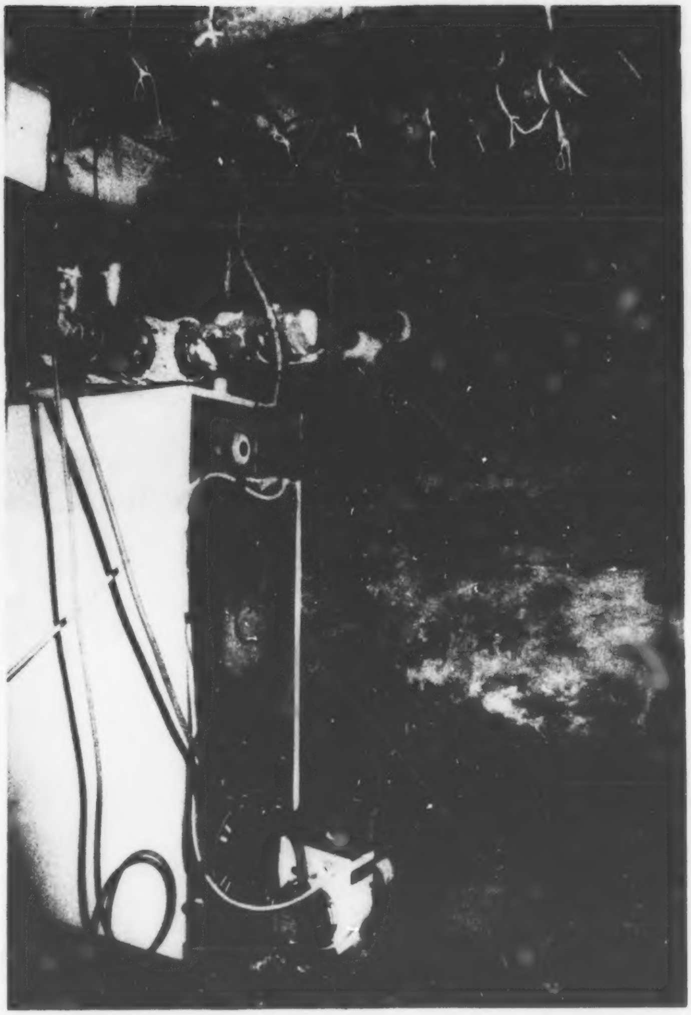
HOUSE 7

OIL FIRED BOILER

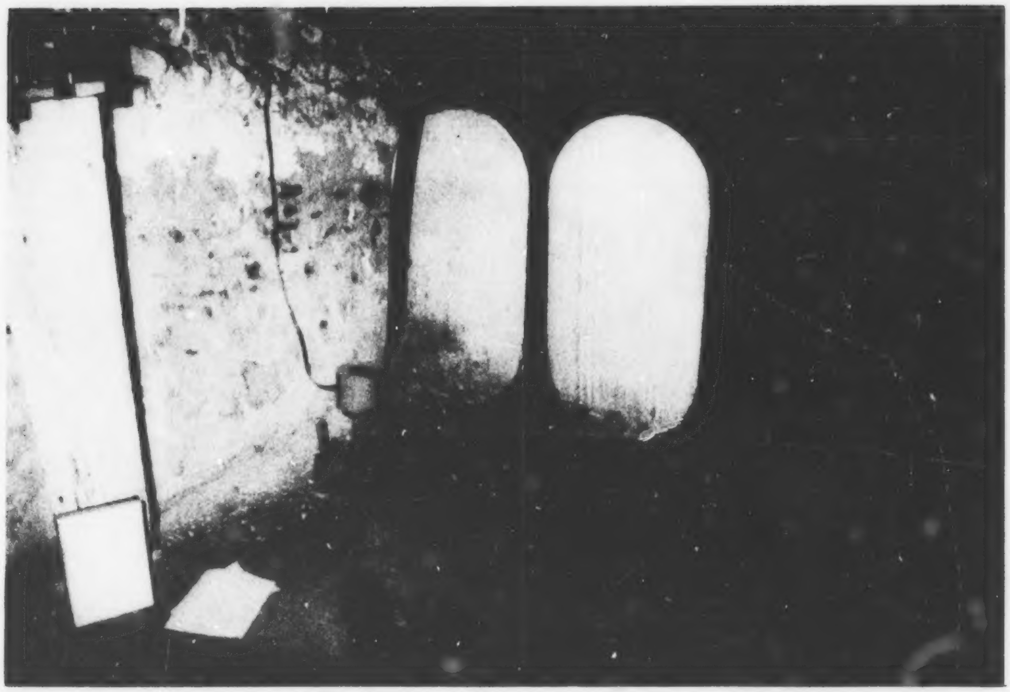


HOUSE 7

OIL FIRED BOILER

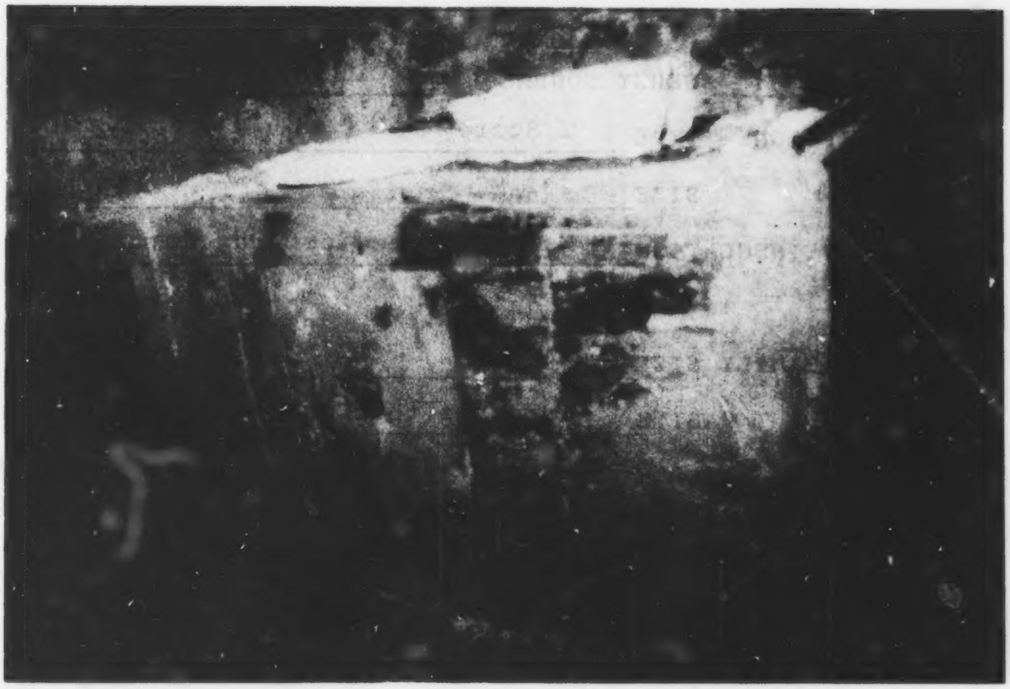


HOUSE 7



DOUBLE OIL TANKS

HOUSE 7



OLD BOILER - PROBABLY OVER 100 YEARS OLD

HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 7 **ENERGY SOURCE-** Oil

BUILDING DESCRIPTION - TYPE 2 Storey

SIZE 232 M^2

INSULATION Walls - none, ceiling some?

OCCUPANTS **FAMILY SIZE** 2

HABITS Turns up thermostat on cold windy days. Opens windows at night.

COMFORT COMPLAINTS North side of house cool. Warm after tune-up

BOILER - TYPE Hydrotherm

AGE 2 **SYSTEM CONDITION** Poor. Took two green garbage bags of soot out of heat exchanger. Combustion chamber bricks breaking up. Repaired

	BEFORE	AFTER
COMBUSTION TEST RESULTS -		
EFFICIENCY -	75%	78%
NET STACK TEMP -	377°C	268°C

COMMENTS Chimney in poor condition. Some valves on upstairs rads jammed shut. Can not open or adjust.

FUEL RECORD ANALYSIS Average kw/degree day before tune-up = 22.10

kw/degree day after tune-up = 11.78

Change in oil consumption since tune-up = -46.69%

RETROFIT OPPORTUNITIES & COSTS

HOUSE 7

Cost of oil used during the last heating season was $2000.

* A) **Line Chimney-** Cost is approximately $350.

* B) **Further Cleaning of the Heat Exchanger-** The homeowner has now had this cleaning completed by another contractor.

* C) **Replace Some Radiator Valves-** Cost unknown.

D) **Flue Damper-** Installed cost is $450. Expected savings would be 9%, or $180 annually, providing a payback period of 2.5 years.

E) **Outdoor Controller-** Installed cost is $350. Expected savings would be 9%, or $180 annually, providing a payback period of 2 years.

F) **High Efficiency Burner-** Installed cost is $900. Expected savings would be 15%, or $300 annually, providing a payback period of 3 years.

G) **High Efficiency Burner and Flue Damper-** Installed cost is $1350. Expected savings would be 17%, or $340 annually, providing a payback period of 4 years.

* H) **High Efficiency Burner and Outdoor Controller-** Installed cost is $1250. Expected savings would be 18%, or $360, providing a payback period of 3.5 years.

* Recommended Option Or Repair

HYDRONIC HOUSE 7

Oil consumption between Nov. 10/1982 and May 3/1983 =

5936 L = 64286.88 Kw

Applicable degree days = 3021.5

kW/degree day = 21.28

Oil consumption between Oct. 31/83 and Jan.25/84 =

4047 L = 43829.01 kW

Applicable degree days = 1912.2

kW/degree day = 22.92

Average kW/degree day before the tune-up = 22.10

Tune-up date - March 7/84.

Oil consumption between March 7/84 and April 26/84 =

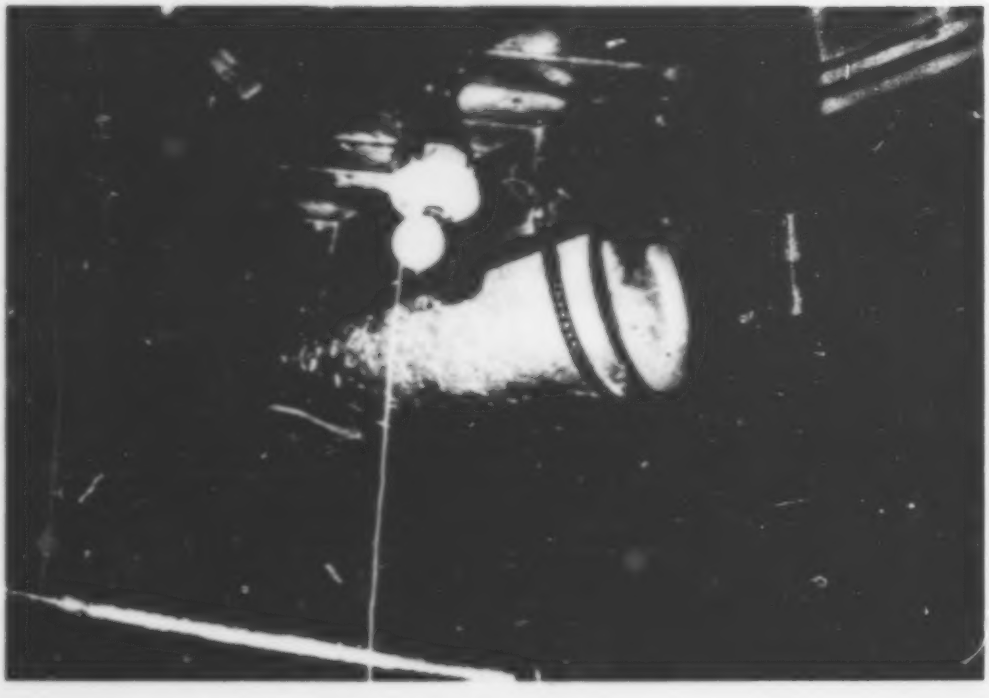
902 L = 9786.7 kW

kW/degree day = 11.78 after tune-up.

Reduction in oil consumption since tune-up = -46.69%

HOUSE 8

BRICK BUNGALOW



EXPANSION TANK

HOUSE 8

MODERN GAS FIRED BOILER

HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 8 **ENERGY SOURCE-** Gas

BUILDING DESCRIPTION - TYPE Bungalow

SIZE $97.5M^2$

INSULATION Walls none. Ceiling 2½" batts

OCCUPANTS **FAMILY SIZE** 5 before tune-up; 6 after

HABITS

COMFORT COMPLAINTS Master bedroom cool

BOILER - TYPE Galaxy cast iron byslant fin

(Dec.5/83)

AGE 2 mos. **SYSTEM CONDITION** Excellent - new

	BEFORE	AFTER
COMBUSTION TEST RESULTS -		
EFFICIENCY -	78.3%	78.3%
NET STACK TEMP -	199°C	199°C

COMMENTS Rad in master bedroom too small

Aquastat should be set to continuous run

FUEL RECORD ANALYSIS Average kw/degree day before tune-up = 11.69

Average kw/degree day after = 10.37

Decrease in gas consumption since tune-up = 11.29%

RETROFIT OPPORTUNITIES & COSTS

HOUSE 8

Cost of gas used for space heating during the last heating season was $1000.

A) **Install a Larger Radiator in the Master Bedroom**- Cost not known.

B) **Set Circulating Pump to Continuous Run**- Cost is $50 and payback is indeterminable.

C) **Outdoor Controller**- Installed cost is $350. Expected savings is 9%, or $90 annually, providing a 3.9 year payback.

HYDRONIC HOUSE 8

Total gas consumed between Dec 12/83 and Feb 13/84 =

1869 M3 = 19344 kW

Applicable degree days = 1654.3

kW/degree day before tune-up = 11.69

Tune-up date - March 6/84

Total gas consumption between March 6/84 and May 10/84 =

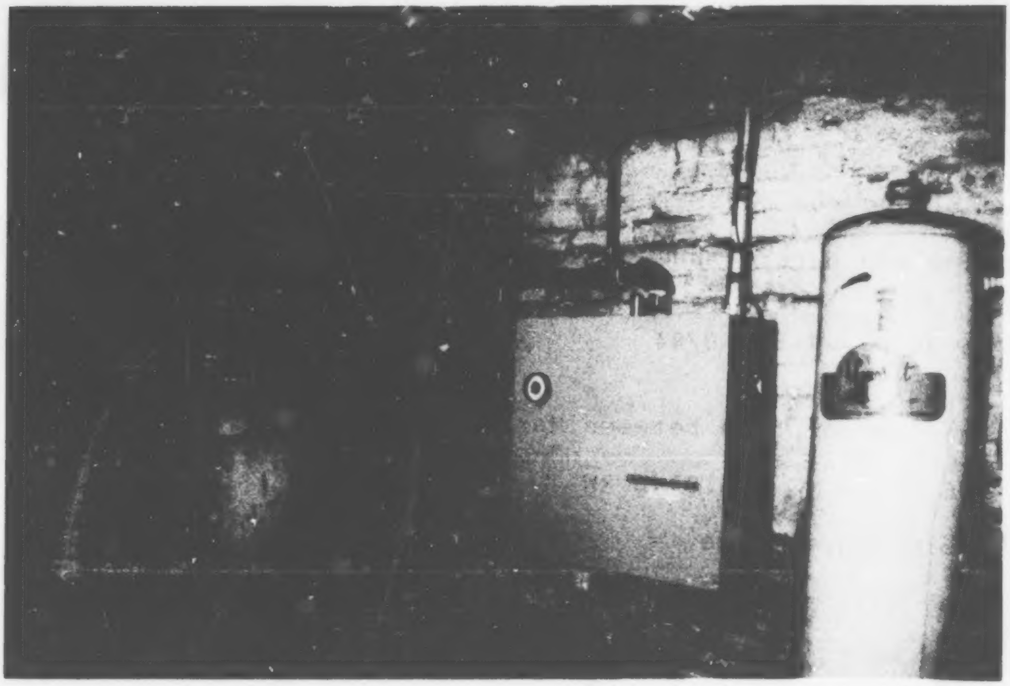
976 M3 = 10101.6 kW

Applicable degree days = 974.3

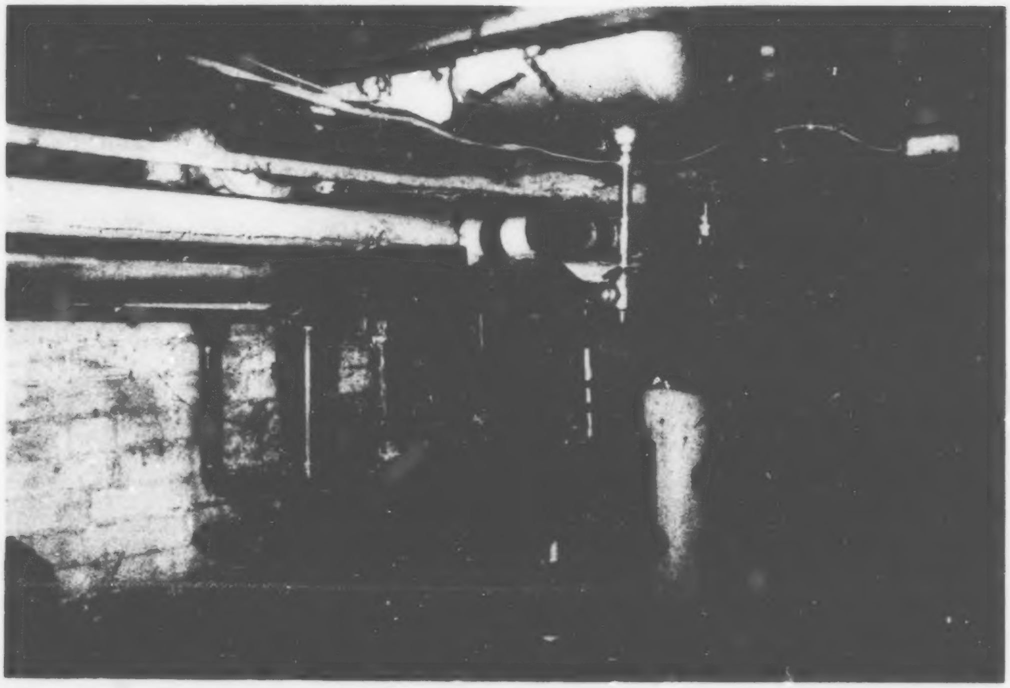
kW/degree day = 10.37 after tune-up.

Decrease in total gas consumption since tune-up = -11.29%

HOUSE 9



ELECTRIC BOILER



ELECTRIC BOILER & EXPANSION TANK

HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 9 ENERGY SOURCE- Electric

BUILDING DESCRIPTION - TYPE Two storey with large one storey studio

SIZE 251 M^2

INSULATION Walls none, ceiling R20-R28

OCCUPANTS FAMILY SIZE 3

HABITS

COMFORT COMPLAINTS None

BOILER - TYPE Chromolux

AGE 1½ years SYSTEM CONDITION Good

	BEFORE	AFTER
COMBUSTION TEST RESULTS -		
EFFICIENCY -	100%	100%
NET STACK TEMP -	-	-

COMMENTS This new system was in excellent condition. Supplemental baseboard heaters used in studio.

FUEL RECORD ANALYSIS NA

Tune-up not completed until early June because owners could not be contacted earlier.

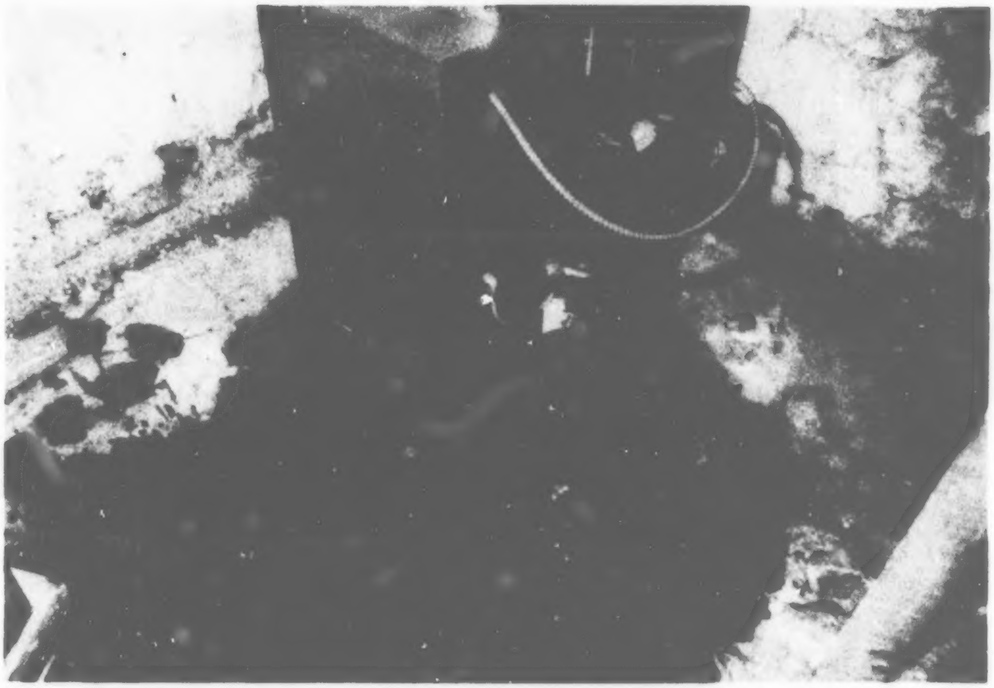
RETROFIT OPPORTUNITIES & COSTS

HOUSE 9

No Retrofit Opportunities.

HOUSE 10

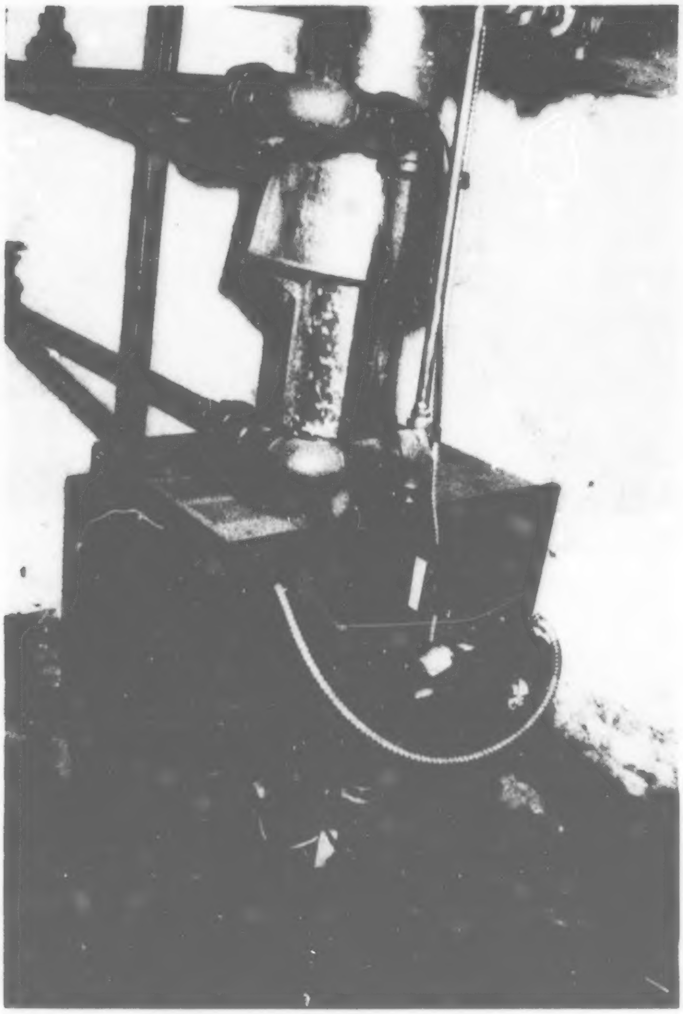
1½ STOREY WOOD SIDED HOUSE



WATER LEAKING FROM DEFECTIVE RELIEF VALVE

HOUSE 10

GAS BOILER



HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 10 ENERGY SOURCE- Gas

BUILDING DESCRIPTION - TYPE 1½ Storeys

SIZE 111 M^2

INSULATION Walls none, ceiling R20 - R28

OCCUPANTS FAMILY SIZE 5

HABITS

COMFORT COMPLAINTS One bedroom upstairs cool because there is no rad in room.

BOILER - TYPE Slantfin Galaxy

AGE 4 yrs. SYSTEM CONDITION Pressure relief valve requires replacement because it is leaking. Pump needs protection from water drips.

	BEFORE	AFTER
COMBUSTION TEST RESULTS -		
EFFICIENCY -	81.3%	182°C
NET STACK TEMP -	81.3%	182°C

COMMENTS

FUEL RECORD ANALYSIS Average kw/DD before tune-up = 5.75

Average kw/degree after tune-up = 4.01

Change in gas consumption = -30.27%

RETROFIT OPPORTUNITIES & COSTS

HOUSE 10

Cost of gas consumed during the last heating season was $700.

A) **New Thermostat-** Installed cost $100. Payback is indeterminable.

* B) **Set Back Thermostat-** Installed cost is $150. Expected savings are difficult to determine,but a typical figure would be 5%, or $35 annually, providing a payback period of 4.3 years.

* C) **Replace Leaking Pressure Release Valve-** Cost unknown.

* D) **Outdoor Controller-** Installed cost is $350. Expected savings are 9%, or $63 annually, providing a payback period of 5.6 years.

* Recommended Option Or Repair

HYDRONIC HOUSE 10

Gas consumption between Feb. 1/83 and June 2/83 =

977 M3 = 10111.95 kW

Applicable degree days = 1733.3

kW/degree day = 5.83

Gas consumed between Aug. 4/83 and Nov. 30/83 =

451 M3 = 4667.85 kW

Applicable degree days = 823.5

Kw/degree day = 5.67

Average kW/degree day before tune-up = 5.75

Tune-up date- Feb. 21/84

Gas consumption between Feb. 21/84 and May 10/84 =

504.7 M = 5223.6 kW

Applicable degree days = 1303.4

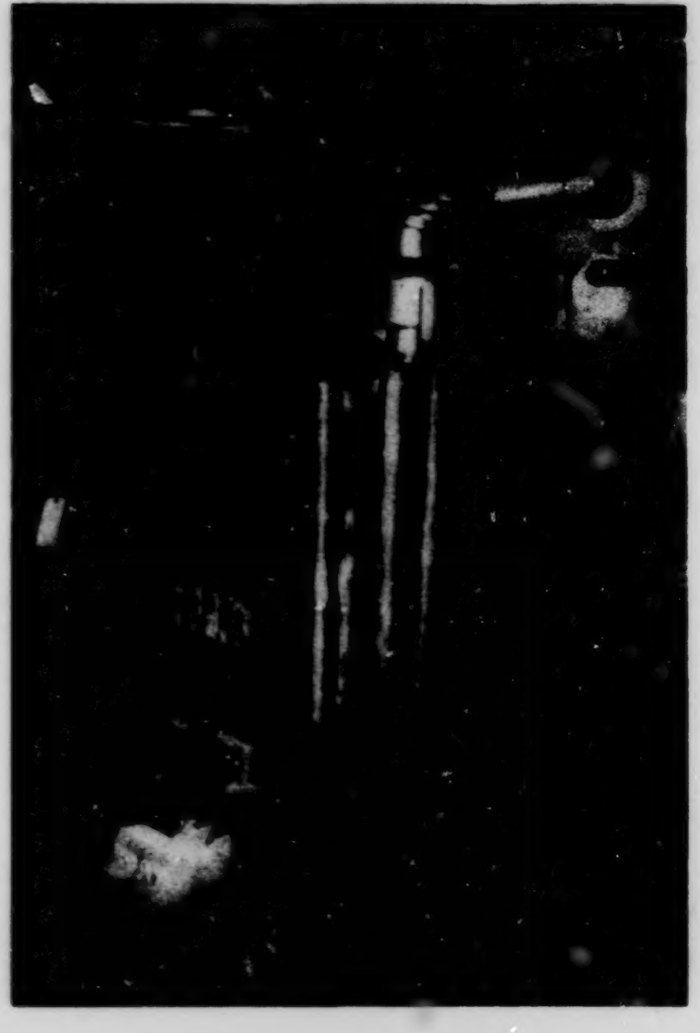
kW/degree day = 4.01 after tune-up.

Change in gas consumption since tune-up = -30.27%

HOUSE 11

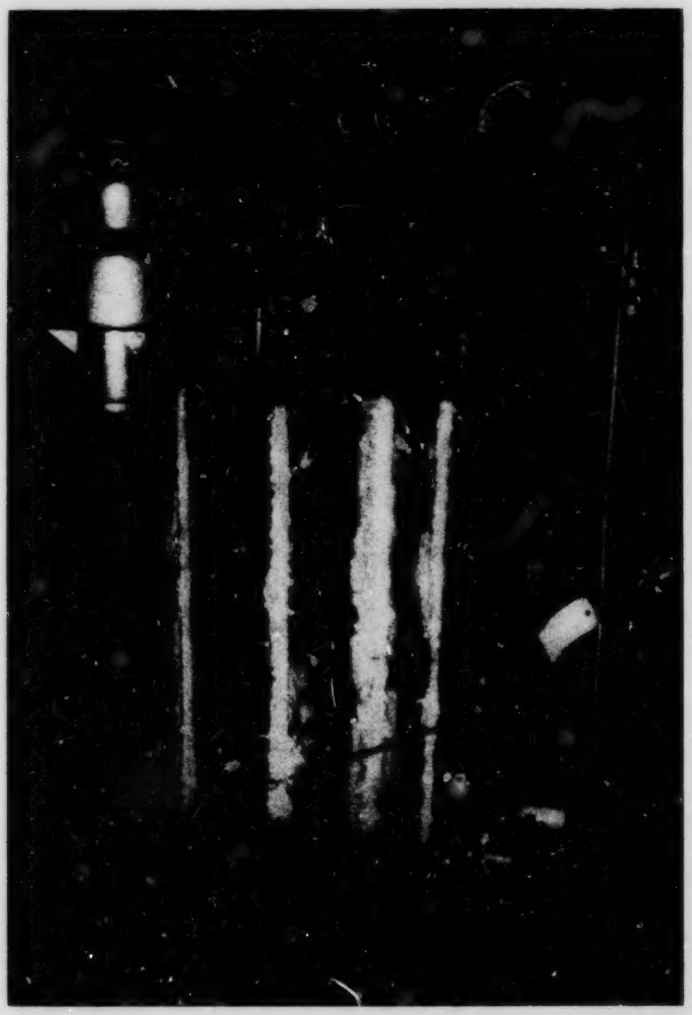
HOUSE 11

GAS CONVERTED BOILER



HOUSE 11

COAL BOILER CONVERTED TO GAS



HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 11 **ENERGY SOURCE-** Gas

BUILDING DESCRIPTION - TYPE 1½ Storey

SIZE 252 M^2

INSULATION Walls none. Ceiling R28

OCCUPANTS **FAMILY SIZE** 3

HABITS Leaves thermostat at one setting.

COMFORT COMPLAINTS Northwest upstairs bedroom cool.

BOILER - TYPE Gurney Coal Conversion w/Economite Burner

Burner 6 Yrs.

AGE 33 Yrs. **SYSTEM CONDITION** Heat exchanger was dirty.

Automatic bleeders no longer work.

	BEFORE	AFTER
COMBUSTION TEST RESULTS -		
EFFICIENCY -	81.9%	175.5°C
NET STACK TEMP -	83%	162.8°C

COMMENTS Thinking of changing to pulse hydronic boiler

FUEL RECORD ANALYSIS Average Kw/degree day before
tune-up = 10.77
Average kw/degree day after = 8.36
Change in gas consumption since tune-up = -22.35%

RETROFIT OPPORTUNITIES & COSTS

HOUSE 11

Cost of annual gas consumption for space heating is $1150.

A) **New Thermostat-** The cost is approximately $100 and the payback period is indeterminable.

* B) **Set-Back Thernostat-** The cost is $150. The savings will vary with the amount and length of set-back, however a savings of 5% is typical. This would reduce the annual heating costs by $57.50, providing a payback period of 2.6 years.

* C) **Insulate Pipes in Unheated Crawl Space-** Cost and payback period is unknown at this time.

* D) **Replace Automatic Bleeders-** Cost not known at this time.

* E) **Further cleaning of Heat Exchanger-** Approximate cost would be $110 and the payback period is indeterminable.

* F) **Rebuild Combustion Chamber-** Cost not known at this time.

G) **Condensing Gas Boiler-** The cost would be approximately $6000. The seasonal efficiency would be 90% compared to 55% for the current boiler. This means that the new boiler would only require 61% of the kW input of the old. This would require $703 of gas, a savings of $447 annually, providing a payback period of 13.4 years.

* Recommended Options Or Repairs

HYDRONIC HOUSE 11

Gas consumption between Feb. 1/83 and June 2/83 =

2173 M3

Less gas used for hot water 384 M3 = 1793 M3 = 18557.55

Applicable degree days = 1706.3

kW/degree day = 10.88

Gas consumption between Sept. 2/83 and Nov. 30/83 =

1133 M3

Less gas used for hot water 285 = 848 M3 = 8776.8 kW

Applicable degree days = 823.5

kW/degree day = 10.66

Average kw/degree day before tune-up = 10.77

Tune-up date- March 7/84.

Gas consumption between April 2/84 and June 21/84 =

804.5 M3 less 347.7 M3 for hot water heating =

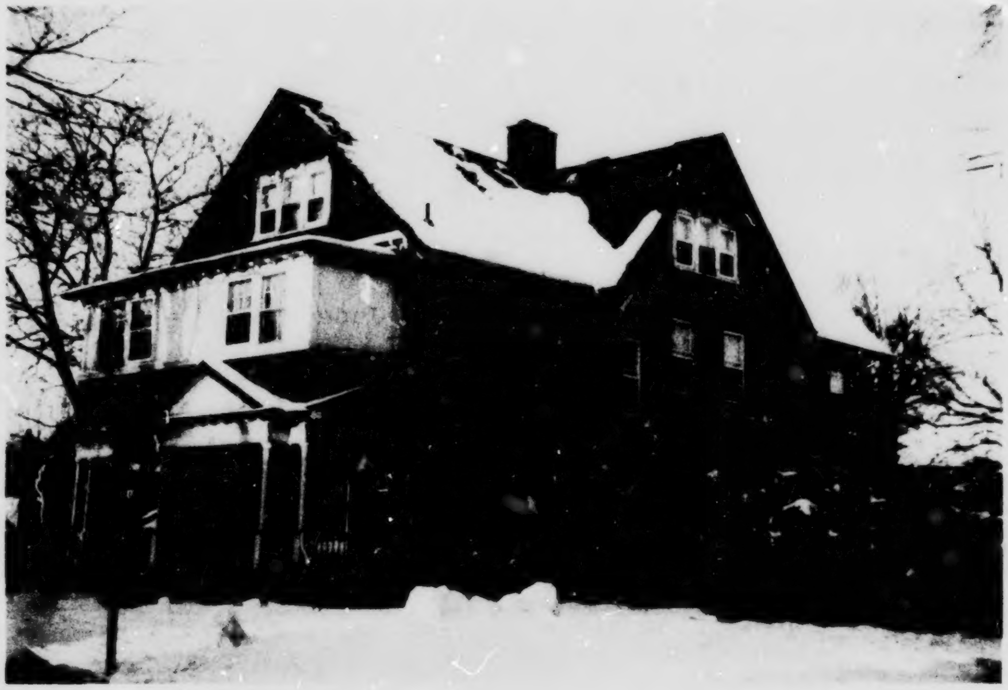
456.8 M3 = 4727.9 kW

Applicable degree days = 565.8

kW/degree day = 8.36 after tune-up

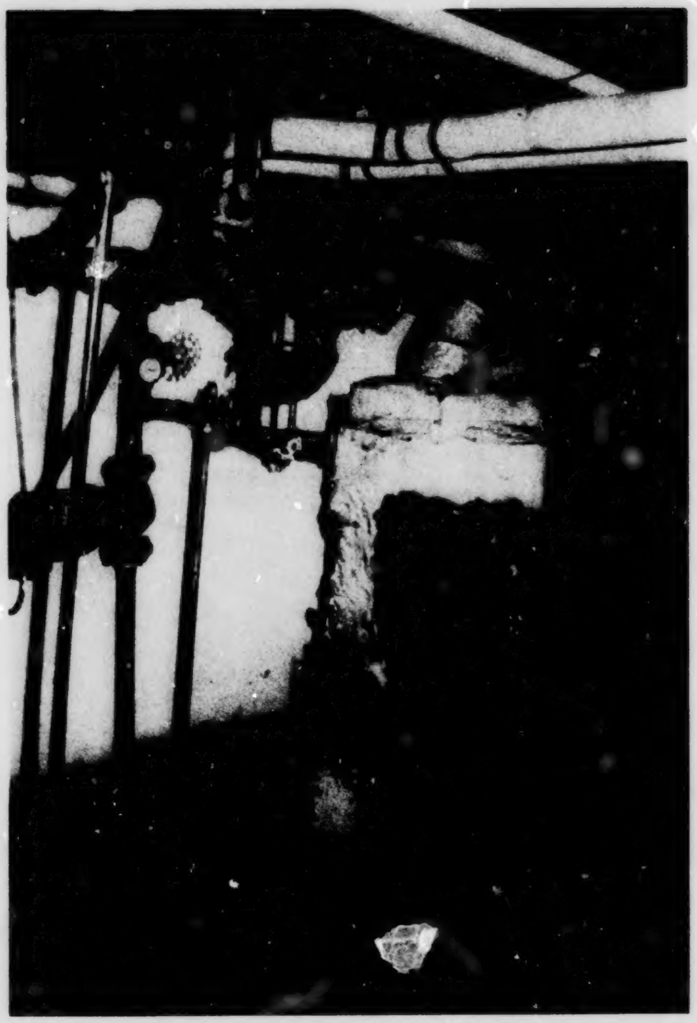
Change in gas consumption since tune-up = -22.35%

HOUSE 12

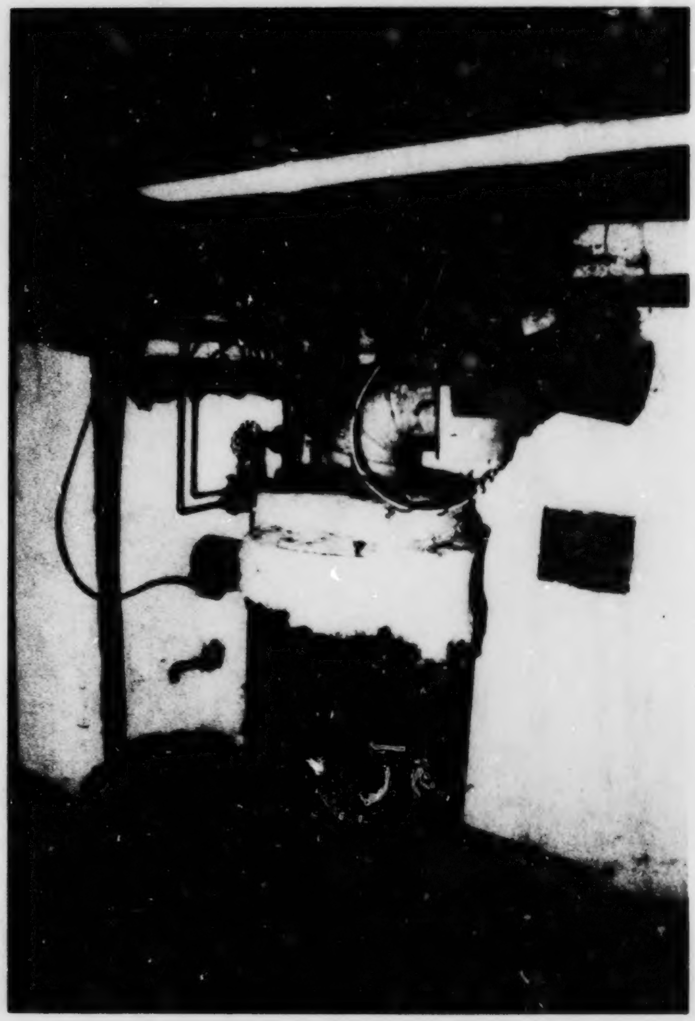


HOUSE 12

OIL FIRED BOILER



OIL FIRED BOILER



HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 12 **ENERGY SOURCE-** Oil

BUILDING DESCRIPTION - TYPE 2½ Storey

SIZE 325 M^2

INSULATION Walls none. Ceiling R20 - R28

OCCUPANTS **FAMILY SIZE** 6

HABITS

COMFORT COMPLAINTS Drafty

BOILER - TYPE Coal conversion unit w/ESSO Burner

AGE 86 **SYSTEM CONDITION** Heat Exchanger Dirty - not cleaned in several years. Brick combustion chamber in poor condition. Chimney needs some repairs.

	BEFORE	AFTER
COMBUSTION TEST RESULTS -		
EFFICIENCY -	74%	74%
NET STACK TEMP -	271.7°C	270°C

COMMENTS Upper level heated by baseboard electric

FUEL RECORD ANALYSIS Average kw/degree day before tune-up = 16.53

Kw/degree day after tune-up = 15.6

Change in oil consumption after tune-up = -5.63%

RETROFIT OPPORTUNITIES & COSTS

HOUSE 12

Cost of annual oil consumption $2200.

A) **Repair Chimney**- Cost not known.

B) **Further Cleaning of the Heat Exchanger**- Approximate cost would be $110. Pay-back period is indeterminable.

* C) **Condensing Gas Boiler**- The installed cost would be $6600. The seasonal efficiency is 90% compared to 55% for the boiler, indicating that 61% less kW of input would be required. Current input is 71335 kW, therefore only 61%, or 43586 kW, or 4211 M^3 of gas would be required annually. The cost of this gas would be approximately $962, providing a savings of $1238 annually. Payback period would be 5.3 years.

* Recommended Option

HYDRONIC HOUSE 12

Oil consumption between Oct. 15/82 and May 16/83 =

5198 L = 56398 kW

Applicable degree days = 3414.2

kW/degree day - 16.5

Oil consumption between Oct. 18/83 and Feb. 2/84 =

3882 L = 42120 kW

Applicable degree days = 2542.3

kW/degree day = 16.57

Average kW/degree day before tune-up = 16.53

Tune-up completed on Feb. 12/84.

Oil consumption between Feb. 2/84 and May 10/84 =

2508 L = 27212 kW

Applicable degree days = 1743.3

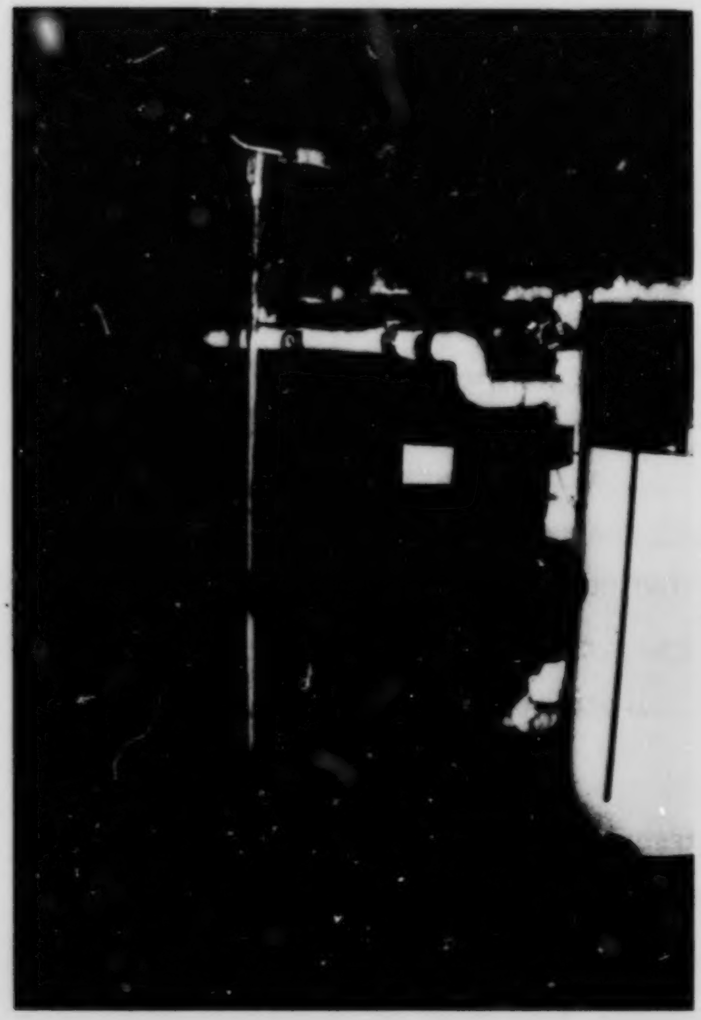
kW/degree day = 15.6

REDUCTION IN OIL CONSUMPTION RESULTING FROM TUNE-UP = -5.63%

HOUSE 13

HOUSE 13

COAL BOILER CONVERTED TO OIL



HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 13 **ENERGY SOURCE-** Oil

BUILDING DESCRIPTION - TYPE Two storey

SIZE 235 M^2

INSULATION Walls none - Ceiling some?

OCCUPANTS **FAMILY SIZE** 4

HABITS Manually lowers thermostat settings when out.

COMFORT COMPLAINTS Middle room upstairs to hot. Valve closed slightly to reduce heat.

BOILER - TYPE ARCO Coal Conversion w/ESSO Burner

AGE 120 **SYSTEM CONDITION** Cement broken in combustion chamber. Requires new smoke pipe and barometric damper. Oil burner air shutter missing.

	BEFORE	AFTER
COMBUSTION TEST RESULTS -		
EFFICIENCY -	72%	72%
NET STACK TEMP -	220°C	220°C

COMMENTS Could not remove oil burner to check nozzel - rusted on to boiler

FUEL RECORD ANALYSIS Average kw/degree day before
tune-up = 18.62
kw/degree day after tune-up = 14.48
Change in oil consumption since tune-up = -22.20%

RETROFIT OPPORTUNITIES & COSTS

HOUSE 13

Annual cost of oil is $2200.

A) **Barometric Damper-** Installed cost would be approximately $110.

* B) **New Auto-Fill Valve-** Cost not known.

C) **Re-build Combustion Chamber-** Cost not known.

* D) **Condensing Gas Boiler-** Installed cost would be $6600. The seasonal efficiency would be 90% compared to 50% for the current boiler, indicating that only 55.6% of the kW input would be required. The current oil consumption is 6587 L, or 71335 kW. The new boiler would require 55.6% of this, or 39662 kW (3832 M^3 of gas). Annual cost would be $875, providing an annual savings of $1325, for a payback period of 5 years.

* Recommended Option & Repair

HYDRONIC HOUSE 13

Oil consumption between Oct.5/82 and May 5/83 =

5479 L = 59337.57 kW

Applicable degree days = 3390.7

kW/degree day = 17.50

Oil consumption between Nov. 11/83 and Dec. 13/83 =

959 L = 10385.97 kW

Applicable degree days = 526.2

kW/degree day = 19.74

Average kW/degree day before tune-up = 18.62

Tune-up date- Feb. 20/84.

Oil consumption between Feb. 21/84 and April 24/84 =

1552 L = 16808 kW

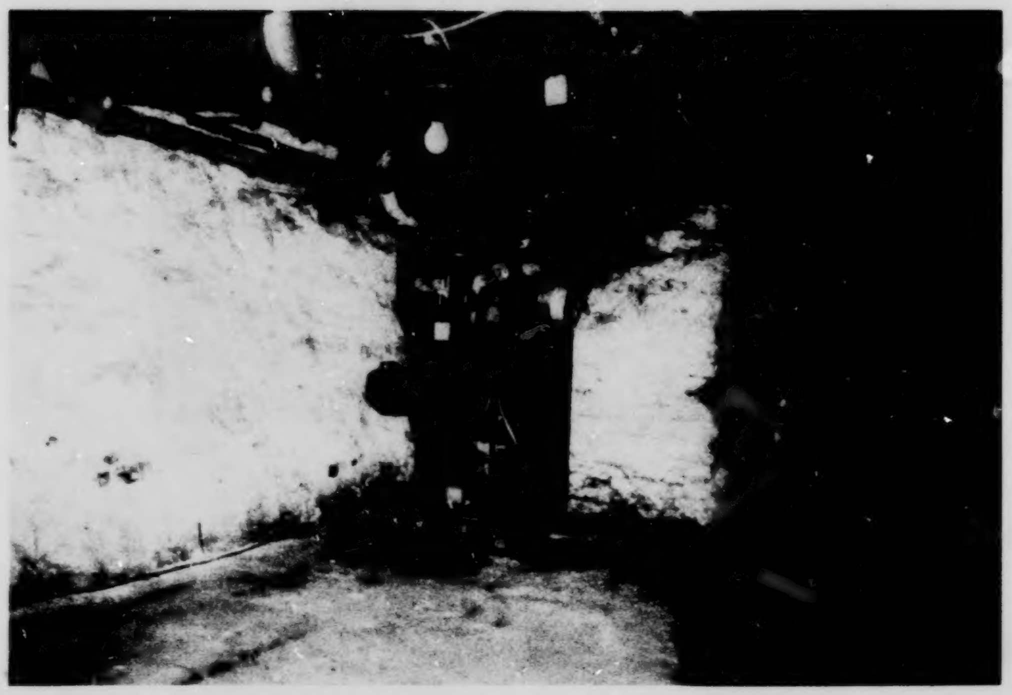
Applicable degree days = 1161

kW/degree day = 14.48 after tune-up

Change in oil consumption since tune-up = -22.20%

HOUSE 14

1½ STOREY CENTURY HOUSE



6 YEAR OLD OIL BOILER WITH LEAKING COMBUSTION CHAMBER

HOUSE 14

DEFECTIVE BOILER

HOUSE 14

DEFECTIVE BOILER

HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 14 **ENERGY SOURCE-** Oil

BUILDING DESCRIPTION - TYPE 1½ Storey

SIZE 186 M^2

INSULATION Walls - none - ceiling?

OCCUPANTS **FAMILY SIZE** 1

HABITS Leaves thermostat at one setting.

COMFORT COMPLAINTS None

BOILER - TYPE Slantfin Malibu

AGE 6 Yrs. **SYSTEM CONDITION** Dangerous. Open combustion chamber seam, spilling combustion gases into house.

	BEFORE	AFTER
COMBUSTION TEST RESULTS -		
EFFICIENCY -	NA	NA
NET STACK TEMP -	341°C	341°C

COMMENTS Boiler to be replaced with hydrotherm pulse unit in June/84

FUEL RECORD ANALYSIS See Special Report

RETROFIT OPPORTUNITIES & COSTS

See Special Report

SPECIAL REPORT ON HOUSE 14

OF THE HYDRONIC TOTAL TUNE-UP FIELD TEST

The Project Manager and the Ministry of Municipal Affairs and Housing visited house 14 for the first time on February 8, 1984. The elderly lady who owned the home agreed to participate in the hydronic system field test. The oil-fired boiler was examined and photographed. It showed severe signs of overheating on the right side outer panel and a pile of corroded metalic debris was on the floor under this panel.

Further conversation with the homeowner revealed that this condition had been present and worsening for 2 years. She advised that she had brought it to the attention of the service person sent by the servicing contractor on each occasion (May 8, 1981 and April 1983). On the last such occasion, the service person commented that, "They are all like that".

The Total Tune-up service technician made this house a priority and visited it on the first day of the tune-ups (Feb. 20/84). He removed the side of the boiler to determine the cause of the burning. He found that the combustion chamber had bent open at the top seam and was allowing hot combustion gases and flames to escape. The flames had eaten through the fiberglass insulation attached to the side panel and were now eating away at the panel itself. The hot gases were badly corroding everything they could reach and were entering the basement.

The flue, where it entered the chimney, was corroded and bent open. The technician wrapped a piece of metal around it as a temporary measure, to stop the flue from falling out of its chimney opening.

At this point, he called the Project Manager to convey his findings. The Project Manager spoke with the owner and advised her that she should leave the house immediately and stay with friends until the problem could be rectified. She refused to leave on the grounds that she had been living with the problem for 2 years and she wasn't going to be panicked now. Since the lady wouldn't leave and we could not turn off the boiler without risk to her health and freezing of water pipes and plants, we decided to leave the basement window open and stuff rags under the basement door to prevent fumes from entering the house.

The Project Manager immediately reported all of the above to the Ministry. It was agreed that, since it was 4:45 p.m., that was all we could do on that day and that the precautionary measures taken should remove the occupant from any immediate danger.

On the following day (Feb. 21/84), every effort was made to contact a Fuel Safety Branch authority to discuss the situation. The Fuel Safety Branch inspector confirmed that we had done all the right things and arranged to meet the Project Manager at the site the following morning (Feb. 22/84). The tune-up technician was also requested to be present. Inspection, by those present, revealed that the horizontal flue was 18 feet long and had no rise from the furnace to the chimney. The flue gas temperature close to the boiler was 620°F net and at the chimney connection 220°F net. The flue itself was not installed in accordance with regulations because the horizontal run was too long (18 feet) and the inclination insufficient. This caused the drop in flue temperature and prevented the establishment of proper draft. The measured draft was "0" with the basement window closed. The unit was rated for a 1.2 gal./hr. nozzel with a 60° spray angle. However, a .75 nozzel was present, with a 70° spray angle.

It appeared that the installing contractor may have improperly installed the boiler. This contractor has since changed ownership and the current owner denied any responsibility for the work done previously. The boiler had been installed about 6 years ago. The contractor who has been servicing the unit was visited by the Fuel Safety Branch officials. The servicing contractor claimed that they cleaned the heat exchanger on each yearly visit and that the .75 nozzel with a ° spray angle would have contributed little to the problem. They also advised that they had had similar problems with this make of boiler. The customer's service bills do not indicate any heat exchanger cleaning, and that is how it appeared. It would have been difficult to clean the heat exchanger for the $38.00 service fee charged because at least 4-5 hours would be required.

Since the boiler seemed to be vulnerable to poor servicing the Fuel Safety Branch suggested contacting CSA regarding this boiler, as there was little they could do.

The Project Manager met with representatives of CSA on Feb. 24/84. They agreed to investigate. After reviewing the relevant data and discussing the situation, CSA concluded that the fault was not with the boiler, but with this installation and servicing (letter attached).

It appeared that we had gone around in circles. Meanwhile, the resident at House 14 reported that the persistant headaches and dizziness that she had had, disappeared, since we had opened the basement window and sealed off the basement door. She was possibly being subjected to carbon monoxide fumes before our visit. It is not inconceivable that the total tune-up visit saved her life.

The cost of repairing the boiler would be about $1,000 including repairing and insulating the flue. Prices were obtained to determine the cost of a mid or high efficiency replacement gas boiler , as the occupant would feel more comfortable knowing that the problem is less likely to re-occur with one of these units. The advantages and disadvantages of replacing versus repairing, were discussed with the owner during a subsequent visit by a Ministry Official and the Project Manager.

Preliminary results of applying these tune-ups to other hydronic systems in this field test appear to indicate that gas and oil hydronic systems are inadequately serviced by "plumbing and heating" contractors. Gas and oil hydronic systems seem to be in much worse condition than the warm air systems that were part of Phase I of this project. The older boilers, that we found in this project, were often 50 to 100 years old and still operating safely. Some newer gas and oil boilers have deteriorated sufficiently in such a short time that their life appears to be only 5 to 10 years.

Pictures detailing the condition of the boiler found in House 14 are attached.

Canadian Standards Association
178 Rexdale Blvd., Rexdale (Toronto), Ontario, Canada M9W 1R3 Telex 06-989344

LR 23003
CL 6415
R 13152

March 08, 1984

W. Douglas Geddes
Manager, Technical & Educational Services
Heating, Refregerating and Air Conditioning
Institute of Canada
5468 Dundas Street West
Suite 226
Islington, Ontario
M9B 6E3

Subject: Brampton

Dear Sir:

We contacted most parties involved in this product incident report regarding the above subject Boiler.

The initial installation of this boiler was contrary to the requirements stated in the Manufacturer's Installation Manuals and the appropriate requirements of CSA Standard B129-1976 Installation Code for Oil Burning Equipment.

The end result, investigated and noted by yourself, Mr. C. Entwistle, Fuels Energy and the Atlas Heating representative, is the rupture of the heat exchange support and side casing of the subject boiler.

Photocopies of the specific requirements are enclosed for reference purposes.

The provision of adequate air for combustion and ventilation purposes governs the efficient and safe operation of all fuel burning equipment.

continue....2/

The subsequent service problems caused by the above installation method would indicate a more thorough maintenance program is also necessary, to prevent the excessive sooting and eventual blockage of the flue passages in this subject boiler.

Yours truly

Jim Hendry

Jim Hendry
Special Service Investigator
Audits & Investigations

(416) 747-4274

encl.

cc Inspection
Main
F/U
JH
SM

INSTALLATION INSTRUCTIONS

MALIBU OIL FIRED CAST IRON BOILER
MODELS M-100 THROUGH M-250.

LOCATION: Mount the boiler near the chimney to keep the flue pipes as short as possible. Boiler must be mounted on a level foundation. Install on non-combustible floor only.

AIR SUPPLY:

A. Enclosed boiler room having normal tight construction requires two unobstructed openings for passage of air into the boiler room.

1. Air drawn vertically from outdoors; One opening on floor and one opening on ceiling each with a minimum free air passage area of 1 square inch per 4000 Btuh of total system input.
2. Air drawn horizontally from outdoors through an outside wall; One louvred opening near the floor (below burner air inlet) and one louvred opening near the ceiling (above the highest draft regulator or draft hood relief openings), each opening with a minimum free air passage area of 1 square inch per 2000 Btuh of total system input.
3. Air drawn from inside the building, One opening near the floor (below burner air inlet) and one opening near the ceiling (above the highest draft regulator or draft hood relief openings), each opening with a minimum free air passage area of 1 square inch per 1000 Btuh of total system input

B. If boilers are installed adjacent to other fuel burning equipment, the area of free openings must be appropriately increased to accommodate the additional load

C. Unless properly controlled, avoid the use of forced ventilation, since it can create an undesirable pressure differential between boiler room and air source

*For further details refer to C G A Standard B 149.1 Installation Code For Gas

FLUE CONNECTION: Connect flue pipe between top of the boiler and chimney Horizontal sections of the flue pipe must be pitched upward to the chimney at least ¼ per foot. The breeching should not exceed 10 ft. of horizontal length The flue pipe should be cemented into the thimble using asbestos shorts The thimble should be flush with the inside surface of the flue liner and the flue pipe should not extend beyond this point Install the draft regulator in the flue pipe, as shown in the separate instructions sheet inside the draft regulator carton

CHIMNEY REQUIREMENTS & DIMENSIONS: Refer to data on page 2 of this manual

A. A vitreous tile lined chimney of the size shown on Page 2 is recommended Local codes apply

B. Check chimney condition
Existing chimneys and stacks may have deteriorated, without repairs their use would be hazardous Before connecting to an old chimney or stack

1. Clean it
2. Inspect it thoroughly
3. Remove obstructions.
4. Replace worn sections of metal stacks.
5. Seal bad masonry joints.
6. Repair damaged linings.

C. Where more than one appliance vents into a common chimney , the area of the common flue should at least equal the area of the largest flue plus 50% of the additional flue areas.

D. Chimney height shall extend at least 3 feet above where it passes through the roof of a building, and at least 2 feet above any ridge within 10 feet of the Chimney

E. Vent connector into chimney must be same size as breeching outlet.

F. Vent connector should be inserted into, but not beyond inside of chimney liner.

G. **CAUTION—UNIT SHALL BE CONNECTED TO A FLUE HAVING SUFFICIENT DRAFT AT ALL TIMES, TO ASSURE SAFE PROPER OPERATION OF THE UNIT.**

ELECTRICAL SUPPLY: Electrical wiring and equipment should be installed in accordance with CSA Standard C22 1, and Canadian Electrical Code, part 1 and any local codes having jurisdiction.

FUEL OIL SUPPLY: Oil piping should be a minimum of ⅜" tube A manual shut-off valve must be installed as close as possible to the oil storage tank. An oil filter of capacity larger than the firing rate of the burner should be installed Oil piping should be protected from kinking or other damage

If the oil tank is installed above or on level with the burner, a one pipe single stage oil system may be used. If the oil tank is installed below the burner, a two pipe single stage oil system may have to be used. If the total lift is more than 8 feet, a two pipe, two stage fuel system must be used

If a booster pump is used care should be taken to see that the pressure on the inlet side of the burner fuel unit does not exceed 8 P S I G

FLOW CONTROL VALVE: When domestic hot water tankless heater is used a flow control valve should be installed in the supply piping as shown in the illustration

MINIMUM CLEARANCES: Above 30" Front 24"
Rear 18 Sides 18"
Flue Pipe 18 inches

AQUASTAT SETTINGS: Low limit should be set at least 20° below the high limit setting

PRESSURE CONTROL SETTING: Recommended high limit setting is 10 P S I G The high limit setting should never exceed 15 P S I G

THE INSTALLATION SHALL BE IN ACCORDANCE WITH THE REGULATIONS OF AUTHORITIES HAVING JURISDICTION. REFERENCE IS MADE TO C.S.A. STANDARD B 139 — 1976 INSTALLATION CODE FOR OIL BURNING EQUIPMENT, FOR RECOMMENDED INSTALLATION PRACTICE.

OPERATING INSTRUCTIONS.

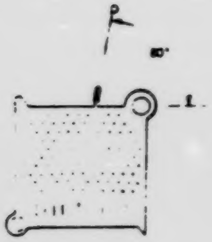
1. Make sure boiler and system are filled with water, and all air is vented from the system. Steam boilers should be filled to the normal water level before firing.
2. Depending on burner model, remove plug or loosen set screw in plug at bottom of oil pump, and bleed air from oil supply line. (See separate instructions furnished with burner). Then tighten plug.
3. With burner operating, close burner air bands until smoky flame is obtained. Then slowly open bands until clean flame is produced.
4. For maximum efficiency and freedom from soot, combustion should be adjusted for CO_2 of at least 10% with not more than No. 2 smoke.
5. Insert draft gauge through observation door; adjust draft regulator until — .01" to — .02" W.C. is obtained over fire.
6. Recheck smoke spot and adjust if necessary.

IMPORTANT: Overfire draft must be maintained at — .01" to .02" W.C. or performance will not be satisfactory.

To maintain rated output, boiler should be cleaned and readjusted once a year, preferably in the fall.

NOZZLE REPLACEMENT: See burner instruction booklet, available from Dealer for proper type and size.

CLEANING INSTRUCTIONS: Remove jacket top cover. Remove nuts holding flue collector brackets. Lift flue collector to expose flue passages. Insert brush between row of pins at 80° angle, working from tip downward. Repeat for each of the five channels between pins. To cover complete surface of heat exchanger, repeat same process in opposite direction. (See diagram).



CLEANING AND FILLING A NEW WATER BOILER

1. **BEFORE FILLING WATER BOILER.**
   A. Check burner to be certain it is ready for firing. DO NO FIRE into an empty boiler
   B. Be prepared to heat raw water to at least 180°F as soon as it is introduced into the boiler. This procedure will remove dissolved, corrosive gases.
   C. Provide drain line, with valve, from boiler. Use a bottom tapping. Line and drain must be suitable for handling caustic solution.

2. **CLEANING WATER BOILER SYSTEM†**
   A. Prepare a boil-out solution of SODIUM HYDROXIDE (caustic soda) or TRI-SODIUM PHOSPHATE.

   NOTE: Use caution in handling chemicals. Caustic soda is harmful to skin, eyes, and clothing.

   1. Proportions: 1 lb. of either chemical per 50 gallons of system water.

   2. Stir chemical in water until dissovled, and pour into the boiler through a top tapping. Replace plug.

   B. Fill the entire system with water.
   C. Start the burner, using start-up procedure.
   D. Circulate the water through the entire system.
   E. Vent the system, including the radiation.
   F. Allow boiler water to reach operating temperature, if possible.
   G. Continue to circulate the water for a few hours.
   H. Shut off the burner.
   I. With CAUTION, drain the boiler solution to a safe location. DO NOT LEAVE SOLUTION IN SYSTEM OVER 2 HOURS.
   J. Wash the water side of the boiler thoroughly using a high pressure water stream. Fill and drain the boiler several times.

3. **TREATING WATER FOR CORROSION CONTROL†**
   (This is not Scale Control)
   A. Prepare a solution of SODIUM CHROMATE. Proportions. 6 oz. per 50 gallons of system water.
   B. Stir chemical into water until dissovled, and pour into the boiler through a top tapping. Replace plug.

4. **FILLING AND VENTING THE WATER BOILER.**
   A. Refill the system with fresh water.
   B. Bring water temperature to at least 180°F. promptly.
   C. Circulate water through entire system.
   D. Vent the system, including the radiation.
   E. The boiler is now ready to be put into service or on standby.
   F. If brand-name air-control devices are used, venting instructions furnished with the devices should be followed.

---

† Water content of boiler is listed on Page 2. Table showing volume of water in standard pipe and tube is on Page II

V — AIR SUPPLY

Boiler should be provided with adequate fresh air for combustion. If the furnace or boiler is installed in a utility room or closet, grilles should be placed near the ceiling and the floor to provide ventilation as well as air for combustion. One square inch minimum free area per 1,000 B.T.U. per hour input or 135 square inches for each gallon per hour input are required in each grille. Outdoor connections should be screened and provided with louvers.

VI — TEST PROCEDURE

1. The burner shall be operated and the fuel rate adjusted to that required for the particular installation.

2. Draft shall be adjusted to amount recommended.

3. Combustion air adjustments are to be made to give the highest CO2. Set air for smoke spot. If the minimum required percentage of CO2 cannot be obtained in the breeching, it will be permissible to take CO2 over the fire, which will be acceptable. A considerable difference between the two CO2 readings indicates a leak of air into the flue passes or fire box of the boiler.

4. Stack temperature shall be recorded after 10 minutes of operation.

VII — ADJUSTMENT OF BURNER FOR BEST EFFICIENCY

1. Set the room thermostat 10 degrees higher than the temperature on the thermometer. Adjust the limit control to 180 degrees. See that the manual reset button of the integral thermal overload switch on the oil burner motor is pushed in. Open all valves and oil lines. Open the fire door or observation door of the furnace or boiler. To purge the air from the oil line and oil pump loosen the plug in the gauge port of the pump (see oil pump instructions). Close the burner switch and allow the burner to run until there are no air bubbles in the oil issuing from the gauge port of the pump. Then tighten the plug in the pump.

2. To obtain best efficiency and performance, adjust the draft regulator alternately with the burner air band adjustment until a 10 to 12% CO2 flue gas analysis is obtained with .01—.02" W.C. over-fire draft. To approach this CO2 reading, close the burner air supply adjustment until a smoky flame is obtained, and then open it only enough so that a clean flame is apparent immediately after the firedoor or observation door is opened. *Use instruments* for proper adjustment of burner. (Smoke anaylser & draft tester).

3. Check the safety controls for proper operation as described in the control manufacturer's instructions.

4. Be sure to leave the installation in a clean and tidy condition.

5. Advise the home owner how to start and stop the oil burner.

6. Return in two or three weeks and recheck burner adjustment and operation. Repeat steps one through six.

VIII — CARE OF HEATING SYSTEMS, FLUE AND CHIMNEY

HEATING SYSTEMS: Different heating units present different problems in care and cleaning. Before installation and during free service period heating units should be thoroughly checked for leakage and air seal.

FLUES: The flue passages should be thoroughly cleaned and resealed to prevent heat loss and poor heat absorption. Wire brushes with suitable handles and vacuum cleaners make good cleaning tools.

The flue pipe should have no obstructions caused by hand dampers or foreign matter

CAUTION: Oil burning equipment shall be connected to flues having sufficient draft at all times to assure safe and proper operation of the burner.

IX — INSTRUCTIONS FOR REMOVAL AND REPLACING BURNER PARTS

MOTOR, FAN AND FLEXIBLE COUPLING
(Refer to Fig. III)

Loosen set screw F. Remove the two screws A1 and A2. The motor may now be removed from the housing, with the fan and coupling attached to its shaft. To remove the coupling, loosen set screw and pull rubber coupling away from shaft. To remove the fan from the motor shaft, loosen set screw C.

PUMP

Loosen screws D1 and D2. Open pipe and tubing connections loosen set screw and remove pump.

TRANSFORMER

Remove screw B and rotate transformer on its hinge.

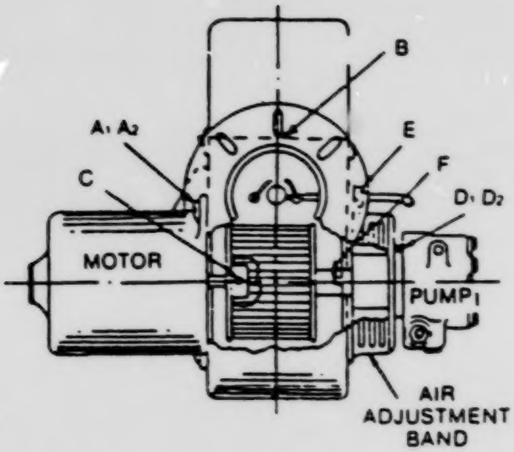


FIG III

(a) Not smaller in cross-sectional area than the flue collar of the appliance, or

(b) May be reduced in cross-sectional area to that equal to a pipe one size smaller, provided that:
  (i) Such reduction is gradual, and
  (ii) That sufficient draft is available at the appliance.

4.2.5.2 The flue pipe shall be constructed on non-combustible material and:

(a) When the flue-gas temperature is less than 750°F, the material shall be at least equivalent in structural strength and durability to galvanized steel as shown in Column 2 of Table 1; or

(b) When the flue-gas temperature is greater than 750°F, the material shall be other than galvanized steel, at least equivalent in structural strength and durability to steel as shown in Column 3 of Table 1.

TABLE 1

MINIMUM FLUE PIPE THICKNESSES

Flue Pipe Diameter Inches	Minimum Thickness Galvanized Sheet Steel Inches	Minimum Thickness for Material Other Than Galvanized Sheet Steel Inches
Up to 8	0.016 (28 ga)	0.016 (26 ga)
Over 8 – 10	0.019 (26 ga)	0.021 (24 ga)
Over 10 – 12	0.024 (24 ga)	*
Over 12	*	*

*As required by acceptable engineering practices.

NOTES: 1 *These thicknesses are minimums acceptable. No reductions are permissible for rolling or mill tolerances.*
2 *When the flue pipe is installed in a location having a corrosive atmosphere, the authority administering this Code may require a thicker material.*

4.2.5.3 Joints in flue pipes shall be made mechanically secure and shall be made tight in accordance with good practice.

4.2.5.4 The flue pipe shall be installed in such a manner as:

(a) To avoid sharp turns or other construction features which would create excessive resistance to the flow of flue gases;

(b) To be as short as practicable and for natural draft burners shall not be longer than 10 feet horizontally unless otherwise approved by the authority enforcing this Code;

(c) To maintain a pitch or rise from the appliance to the chimney of at least ¼ inch per foot of horizontal length.

(d) To extend through the chimney wall and flush with the inner face of the chimney flue.

(e) To have a clearance between the flue pipe and combustible construction of not less than the clearance required in Clause 7; and

(f) To have provisions for cleaning either by clean-outs in the flue pipe or by removal of the flue pipe.

4.2.5.5 The flue pipe shall be firmly connected to the thimble which shall be permanently cemented in place with a non-combustible material which will not crack or check.

4.2.5.6 The flue pipe shall be securely supported in position.

4.2.5.7 The flue pipe shall not pass through any floor or ceiling.

4.2.5.8 When two or more appliances, excluding incinerators and fireplaces, are connected to the same flue:

(a) The appliances shall be located on the same storey.

(b) The flue outlet pressure of each appliance shall be negative;

(c) Each appliance shall be equipped with individual draft control, unless otherwise certified, so as to maintain the over-fire pressure (draft) specified by the appliance manufacturer;

(d) The flue pipes of the appliances shall be connected directly to a common flue pipe (breeching) of adequate cross-sectional area and as close to the chimney as practicable or directly to the chimney flue in the following order:
  (i) If only oil is used, the flue pipe from the smallest appliance shall be on top.
  (ii) If different fuels are used, the gas flue pipe shall be on top, the oil flue pipe in the middle and the coal flue pipe on bottom.

NOTE: *The flue pipe from a vaporizing burner should be installed in such a manner as to prevent the extinguishing of its low or pilot fire on start up of another appliance.*

(e) The chimney flue shall be capable of venting the flue gas by natural draft when all appliances are firing at the same time; or a mechanical flue-gas exhauster (draft inducer) shall be used;

(f) Notwithstanding Clause 4.2.5.8(e) where a chimney flue vents only oil-fired appliances, two or more oil-fired appliances in excess of the chimney flue capacity may be connected to a common chimney flue providing they are equipped with a means to ensure that only the number of appliances the chimney is capable of venting shall operate at any one time simultaneously.

4.2.5.9 When the total flue-gas temperature exceeds 750°F (when determined in accordance with Clause 5.2.1.1) the flue pipe shall not pass through a combustible wall or partition.

4.2.5.10 When the total flue-gas temperature is 750°F or less (when determined in accordance with Clause 5.2.1.1) the flue pipe may pass through combustible walls or partitions, provided the construction is guarded at the point of passage by

(a) A metal ventilated thimble not less than 12 inches larger in diameter than the pipe. ;

(b) A metal or burned fire-clay thimble built in brickwork or other similar materials extending not less than 8 inches beyond all sides of the thimble; or

(c) In lieu of such protection as contained in (a) and (b) all combustible material in the wall or partition shall be cut away from the flue pipe a sufficient distance to provide the clearance required as indicated in Table 3 from such flue pipe. Any material used to close up such opening shall be non-combustible insulating material.

4.2.6 Flue Pipe Dampers

4.2.6.1 A manually operated damper shall not be placed in the flue pipe of an oil-fired appliance, except stoves using sleeve-type burners or as permitted by Clause 4.2.6.2

4.2.6.2 Baffles and manually-operated dampers, when permitted, shall be so constructed that they shall not close off more than 80 per cent of the internal cross-sectional area of the flue pipe unless interlocked to prevent the burner from starting until the damper is fully open

4.2.6.3 Automatically-operated dampers used to control the draft shall be designed and arranged to maintain a safe damper opening at all times, and to prevent starting of the burner unless the damper is opened at least 20 per cent of the internal cross-sectional area of the flue pipe. The damper may be fully closed when there is no demand for the burner to operate.

4.2.6.4 Other automatically-operated dampers not included in Clause 4.2.6.3 shall be designed to fully open on starting the burner and shall be so constructed that no more than 80 per cent of the internal cross-sectional area of the flue pipe can be closed off. The opening(s) shall be so located that the total area of the openings will not be substantially reduced by carbon build-up

4.2.7 Draft Regulators

4.2.7.1 A certified draft regulator shall be installed in the flue pipe of each oil burning appliance except for:

(a) Installations using automatically-operated dampers;

(b) Appliances using sleeve-type burners; or

(c) Appliances certified for use without draft regulators.

4.2.7.2 A draft regulator, when used, shall be installed in the same room or enclosure as the appliance, and shall be located where it will not interfere with the supply of combustion air to the oil burner.

4.2.7.3 The location and the mounting of the draft regulator shall be in accordance with the recommendations of the manufacturer.

4.2.8 Heat Reclaimers

4.2.8.1 The heat reclaimer shall be certified by a nationally recognized testing agency and shall bear the mark of that agency.

4.2.8.2 A heat reclaimer shall be installed in the flue pipe from an oil burning appliance only:

(a) After the oil burning appliance has been installed and operated in accordance with the oil burning appliance manufacturer's instructions.

(b) When, after installation of the heat reclaimer, the oil burning appliance will still operate in accordance with the oil burning appliance manufacturer's instructions;

(c) Providing the following conditions exist after installation of the heat reclaimer:

  (i) The clearance to combustible construction is at least 18 inches; and

  (ii) A certified barometric type draft regulator is installed between the heat reclaimer and the chimney; and

  (iii) A minimum draft of 0.04 inch W.C. is available upstream from the heat reclaimer or there is a minimum over-fire draft of 0.02 inch W.C.; and

  (iv) The flue-gas temperature is 500°F or more upstream from the heat reclaimer and the measured temperature (total) of the flue gas at the entrance to the chimney is not less than stipulated in Clause 5.2.4.2. and

(d) When adequate air supply is provided to the burner and furnace room to compensate for the air drawn from the area through the heat reclaimer

4.2.8.3 The installation shall comply with the requirements of the authority administering this Code.

4.2.8.4 The heat reclaimer shall not be installed within the supply or return plenum.

4.3 Air for Combustion and Ventilation

4.3.1 General

4.3.1.1 Oil burning appliances shall be installed only where:

(a) An adequate supply of combustion air is available to assure proper combustion;

(b) Ambient air temperatures are maintained within safe operating limits; and

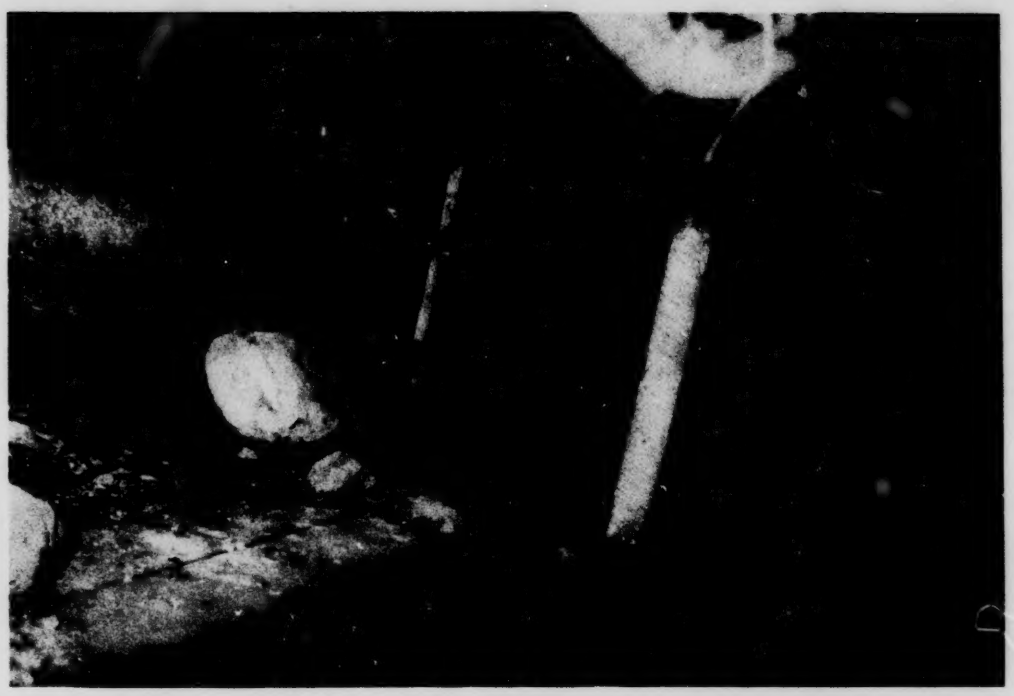
(c) Provision is made to compensate for the air drawn from the area by other appliances such as exhaust fans, clothes dryers or fireplaces.

4.3.1.2 Oil burning appliances shall be located in such a manner as not to interfere with proper circulation of air for combustion or ventilation within the space

4.3.1.3 When the building construction is such that normal infiltration does not meet the requirements for combustion air and ventilating air, outside air shall be introduced to the space in which the oil burning appliance is located.

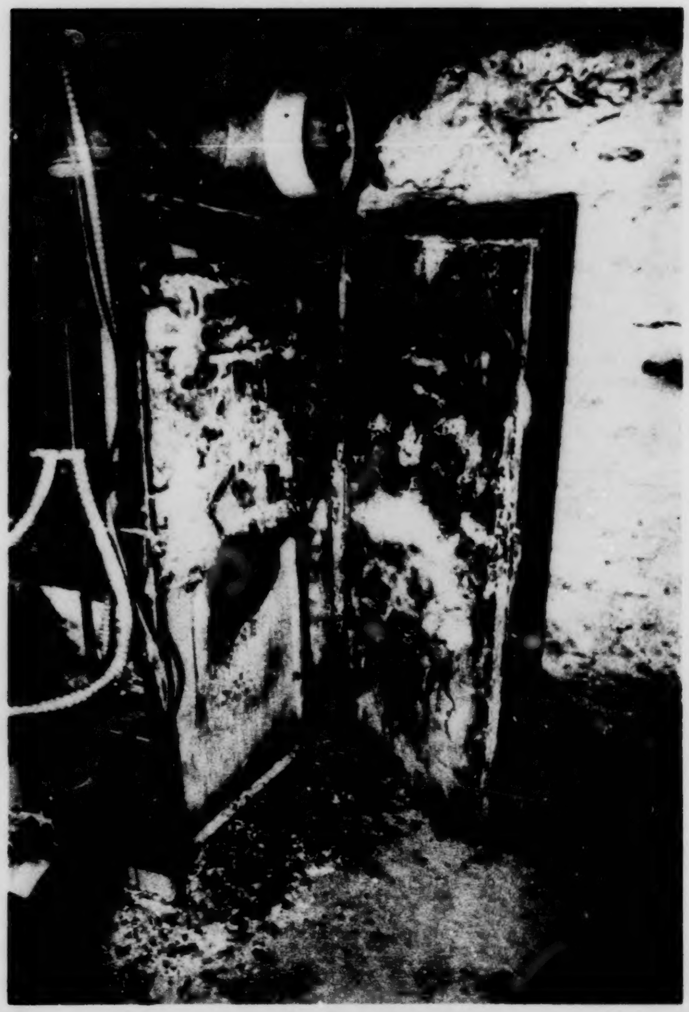
NOTE: *See Appendix A for data on supply of air for combustion and ventilation.*

HOUSE 14

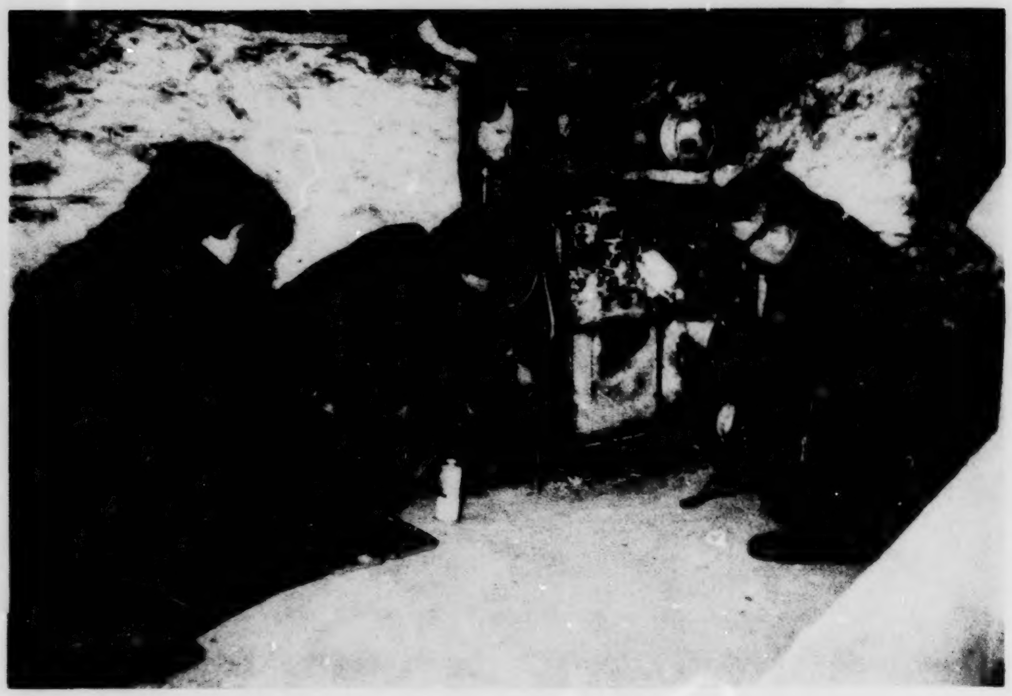


5.5 METER FLUE RUN

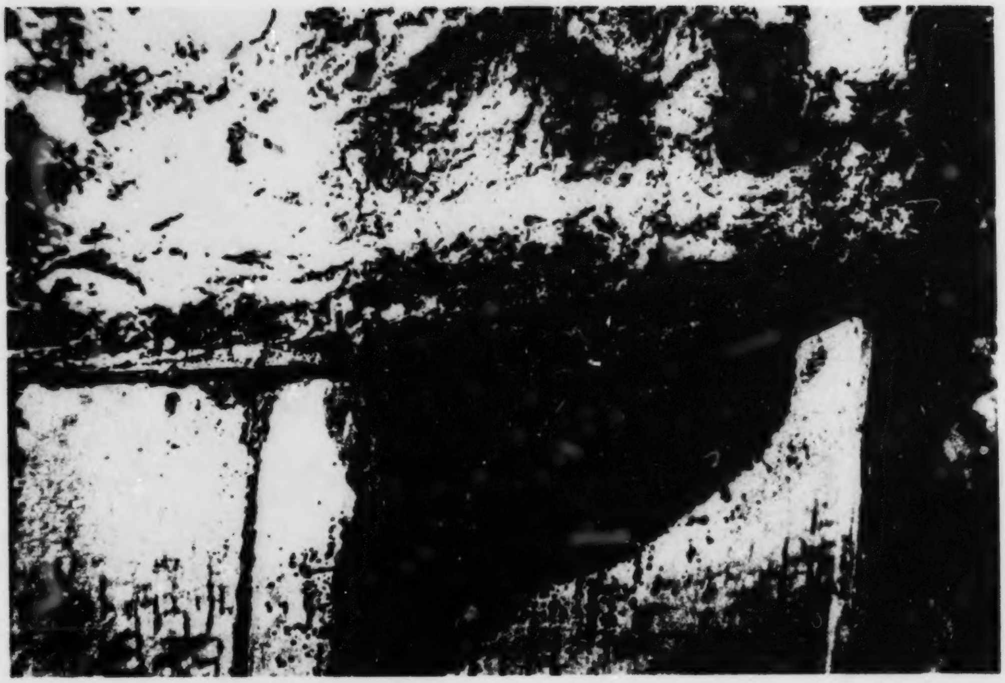
OPENING IN COMBUSTION CHAMBER



OIL BOILER
WITH OPENING
IN COMBUSTION
CHAMBER
HOUSE 14



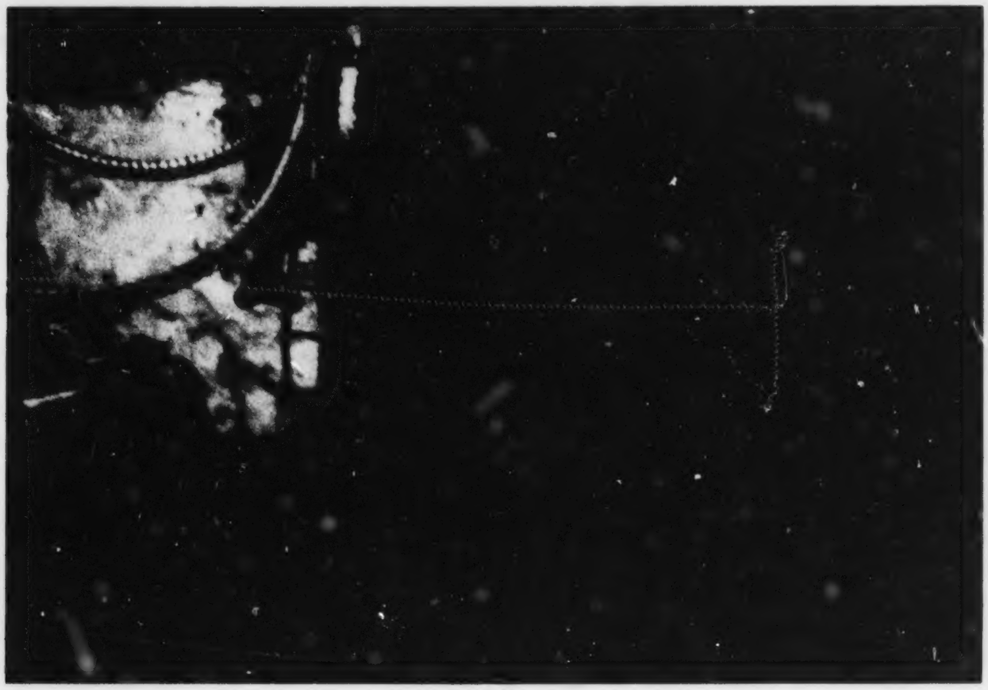
VISIT BY FUEL SAFETY BRANCH PERSONNEL



OPENING IN COMBUSTION CHAMBER

OPENING IN COMBUSTION CHAMBER

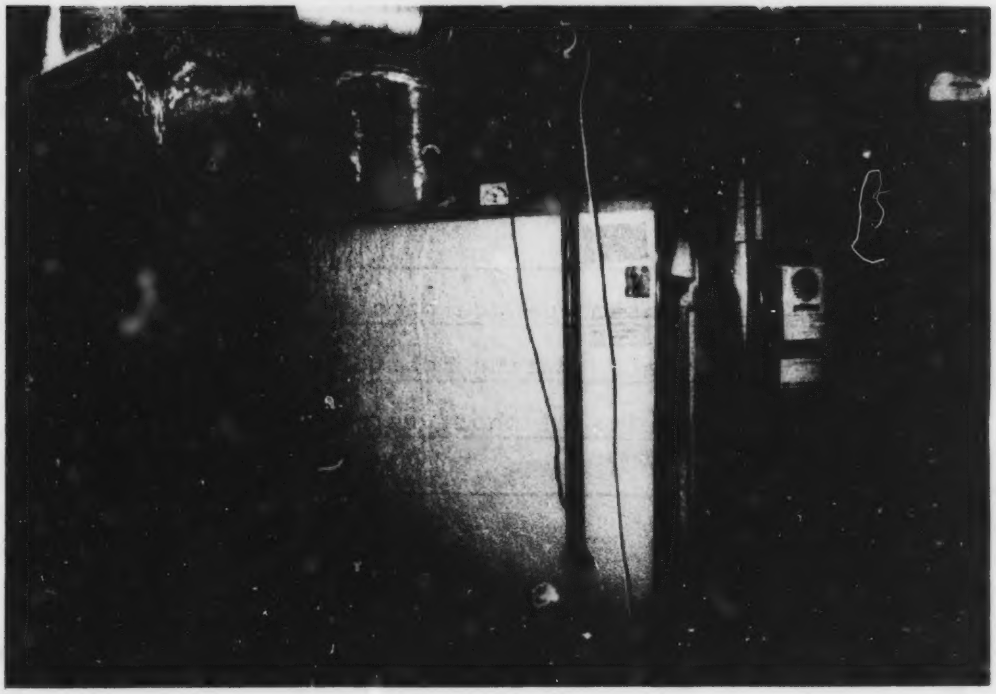
FLAME EMITTING FROM COMBUSTION CHAMBER



FLAME EMITTING FROM COMBUSTION CHAMBER

HOUSE 15

2 STOREY HOUSE



GAS FURNACE WITH CUSTOM DRAFT HOOD

HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 15 **ENERGY SOURCE-** Gas

BUILDING DESCRIPTION - TYPE 1¼ Storey

SIZE 149 M^2

INSULATION Walls - R12 & R44, Ceiling - 4"

OCCUPANTS **FAMILY SIZE** 3

HABITS Increases thermostat setting
when cool

COMFORT COMPLAINTS Living room and kitchen cool

BOILER - TYPE EMCO Jet Heat

AGE 28 **SYSTEM CONDITION** Heat exchange not
cleaned for years.

	BEFORE	**AFTER**
COMBUSTION TEST RESULTS -		
EFFICIENCY -	77%	79%
NET STACK TEMP -	171°C	160.6°C

COMMENTS Chimney is asbestos sewage pipe.
Gas meter replaced during monitoring period. This
may affect results of short term monitoring.

FUEL RECORD ANALYSIS Average kw/degree day before tune-up = 5.53

Kw/degree day after tune-up = 6.1

Change in gas consumption since tune-up = +10.32%

RETROFIT OPPORTUNITIES & COSTS

HOUSE 15

Annual cost of gas for space heating is $675.

* A) **Set Back Thermostat-** Installed cost is approximately $150. Savings vary depending on the amount and length of setback, however 5% is a typical savings and would produce an annual savings of $34, providing a payback period of 4.4 years.

B) **Outdoor Controller-** Installed cost is $350. Annual savings would be 9%, or $61, providing a payback period of 5.7 years.

* Recommended Option

HYDRONIC HOUSE 15

Gas consumed during the 1982/1983 heating season =

2673 M3 less 700 for hot water = 1973 M3 = 20420.55 kW

Applicable degree days = 3635

kW/degree day = 5.62

Gas consumed between Aug. 4/83 and Feb. 1/84 = 1702 M3

Less 420 M3 used for hot water = 1282 M3 = 13268.7 kW

Applicable degree days = 2438.5

kW/degree day = 5.44

Average kW/degree day before tune-up = 5.53

Tune-up date- Feb. 21/84.

Gas consumption between April 2/84 and May 10/84 =

360.6 M3 Less 88.9 for the water heater =

231.7 M3 = 2398 Kw

Applicable degree days = 393

kW/degree day = 6.1 * after tune-up.

* A new gas meter was installed during the monitoring period, significantly shortening the monitoring period and possibly jeoprodized the accuracy.

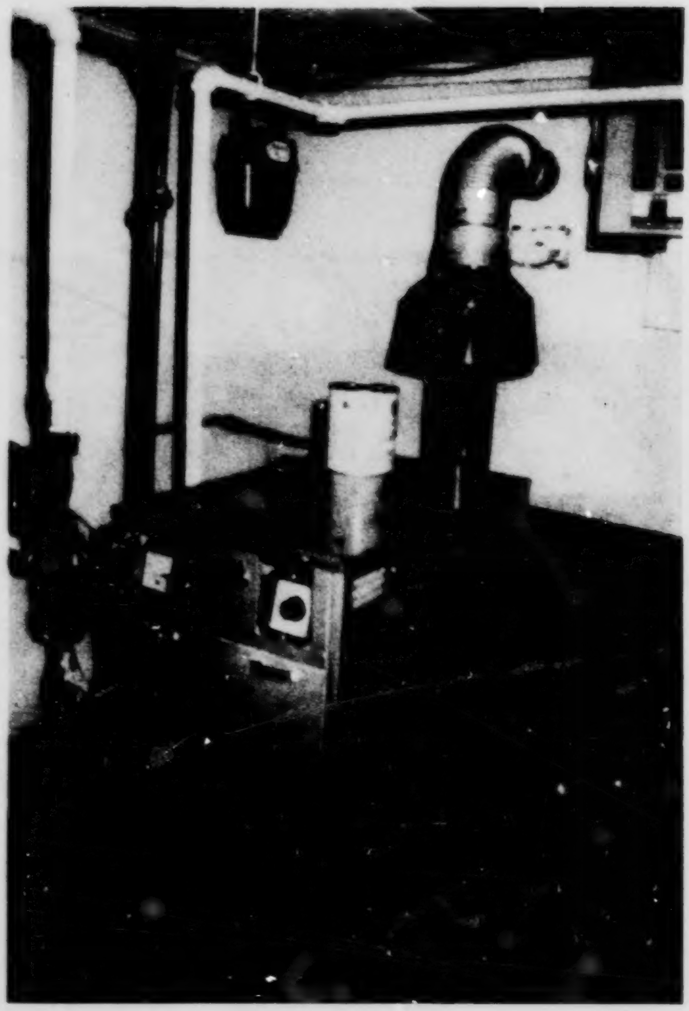
Change in gas consumption for space heating since the tune-up =

10.32%

HOUSE 16

HOUSE 16

GAS BOILER



HOUSE 16

CIRCULATING PUMP & EXPANSION TANK

HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 16 **ENERGY SOURCE-** Gas

BUILDING DESCRIPTION - TYPE 1½ Storey

SIZE 167 M^2

INSULATION Walls - some, ceiling - R28

OCCUPANTS **FAMILY SIZE** 5

HABITS Leaves thermostat at one setting

COMFORT COMPLAINTS Main floor bedroom cool

BOILER - TYPE Ruudiator 220

AGE ? **SYSTEM CONDITION** Poor. One half of heater exchanger fins have corroded away.

	BEFORE	AFTER
COMBUSTION TEST RESULTS -		
EFFICIENCY -	79%	79%
NET STACK T[illegible] -	242°C	220°C

COMMENTS System oversized 200 to 300%

FUEL RECORD ANALYSIS Average kw/degree day before tune-up = 11.89

Kw/degree day after tune-up = 9.67

Change in gas consumption since tune-up = -18.68%

RETROFIT OPPORTUNITIES & COSTS

HOUSE 16

Annual cost of gas used for space heating is $1050.

A) Set Circulation Pump to Continuous Run- Cost would be approximately $50. Payback period is indeterminable.

B) Outdoor Controller- Installed cost is $350. Savings would be 9%, or $94.5 annually, providing a 3.7 year payback.

HYDRONIC HOUSE 16

Gas consumtion for heating between Dec. 3/81 and June 9/82 =
4425.6 M3 = 45805 kW
Applicable degree days = 3287
kW/degree day = 13.94

Gas consumption between Oct. 4/82 and April 5/83 =
3012.7 M3 = 31181.4 kW
Applicable degree days = 3052.7
kW/degree day = 10.21

Gas consumption between Oct. 5/83 and Feb. 1/84 =
2598 M3 = 26889 kw
Applicable degree days = 2334.9
kW/degree day = 11.52

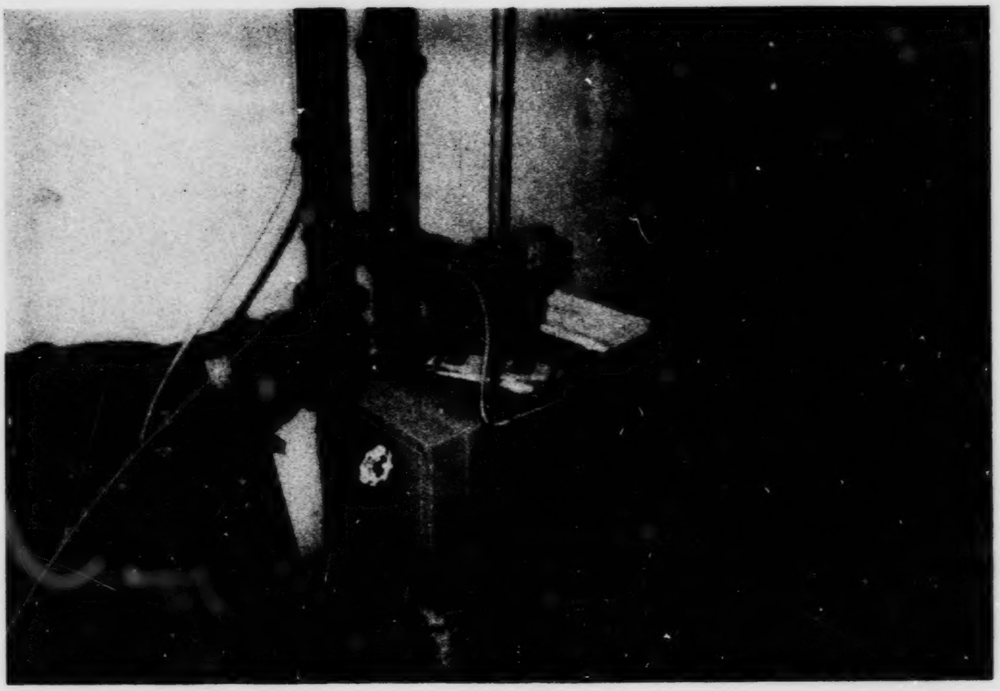
Average kW/ degree day before tune-up = 11.89

Tune-up date = Feb. 20/84
Gas consumption between Feb. 20/84 and March 15/84 =
552 M3 = 5713 kW
Applicable degree days = 590.9
kW/degree day after tune-up = 9.67

Reduction in gas consumption after tune-up = -18.68%

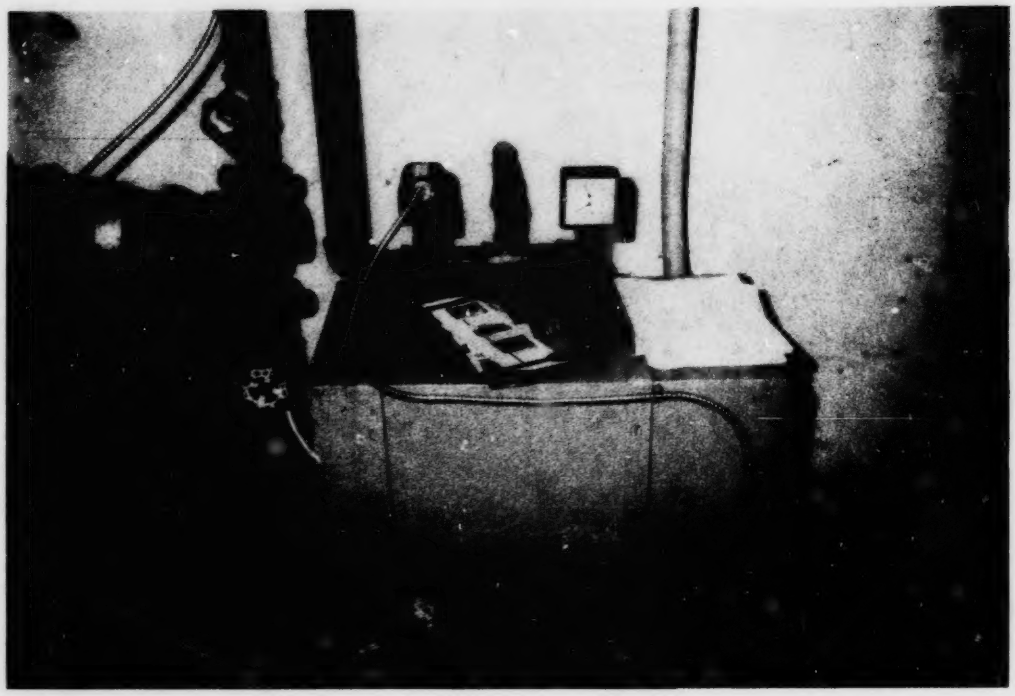
HOUSE 17

2 STOREY BRICK HOUSE



ELECTRIC BOILER

HOUSE 17



ELECTRIC BOILER

HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 17 **ENERGY SOURCE-** Electric

BUILDING DESCRIPTION - TYPE Two storey

SIZE 139 M^2

INSULATION Walls none, ceiling some?

OCCUPANTS **FAMILY SIZE** 3

HABITS Leaves thermostat at one setting.

COMFORT COMPLAINTS Family room cool - needs pipe or crawl space instulation.

BOILER - TYPE Chromolux CWF 27

AGE 3 **SYSTEM CONDITION** Good

	BEFORE	AFTER
COMBUSTION TEST RESULTS -		
EFFICIENCY -	-	-
NET STACK TEMP -	-	-

COMMENTS Does not want set-back thermostat

FUEL RECORD ANALYSIS kw/degree day before tune-up = 6.32

kw/degree day after tune-up = 7.98

Increase in electrical consumption since tune-up = 26.3%

RETROFIT OPPORTUNITIES & COSTS

Insulate pipe in crawl space - cost and payback period unknown.

HYDRONIC HOUSE 17

Electricity consumed between Nov. 18/83 and Feb. 20/84 =

16130 kW less 2256 kW used for other than heating =

13874 kW for space heating.

Applicable degree days = 2194.3

kW/degree day = 6.32

Tune-up date - Feb. 21/84.

Electricity consumed between Feb. 20/84 and May 17/84 =

12890 kW, less 2088 kW used for other than heating =

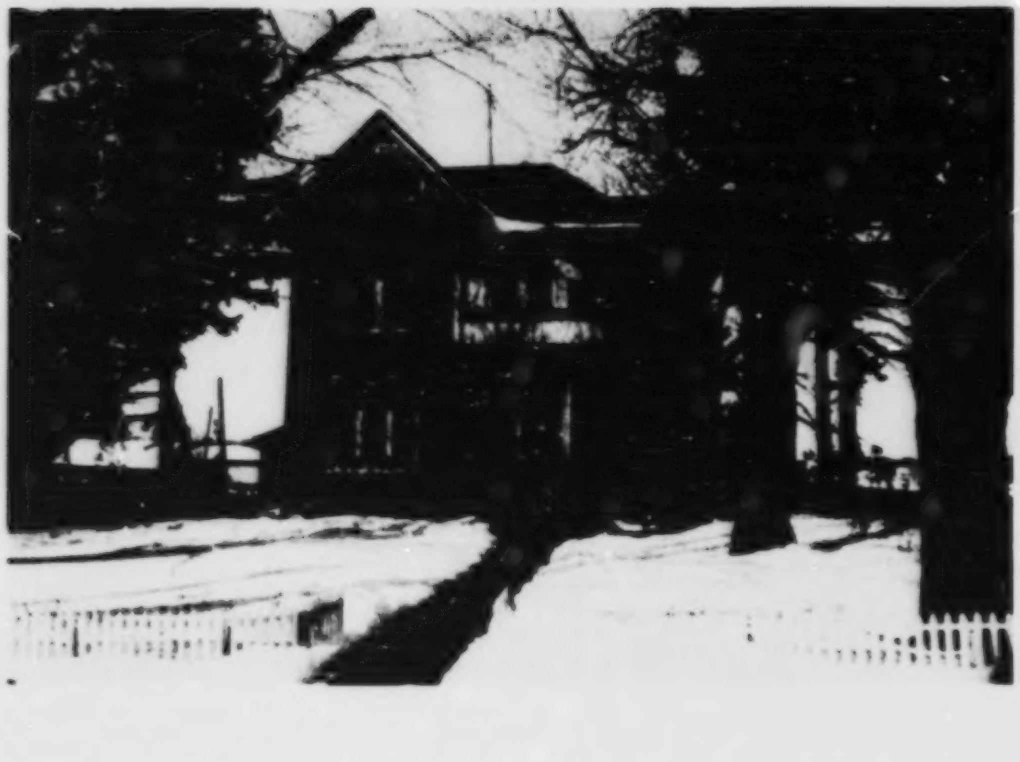
10802 kW for space heating.

Applicable degree days = 1352.8

kW/degree day = 7.98

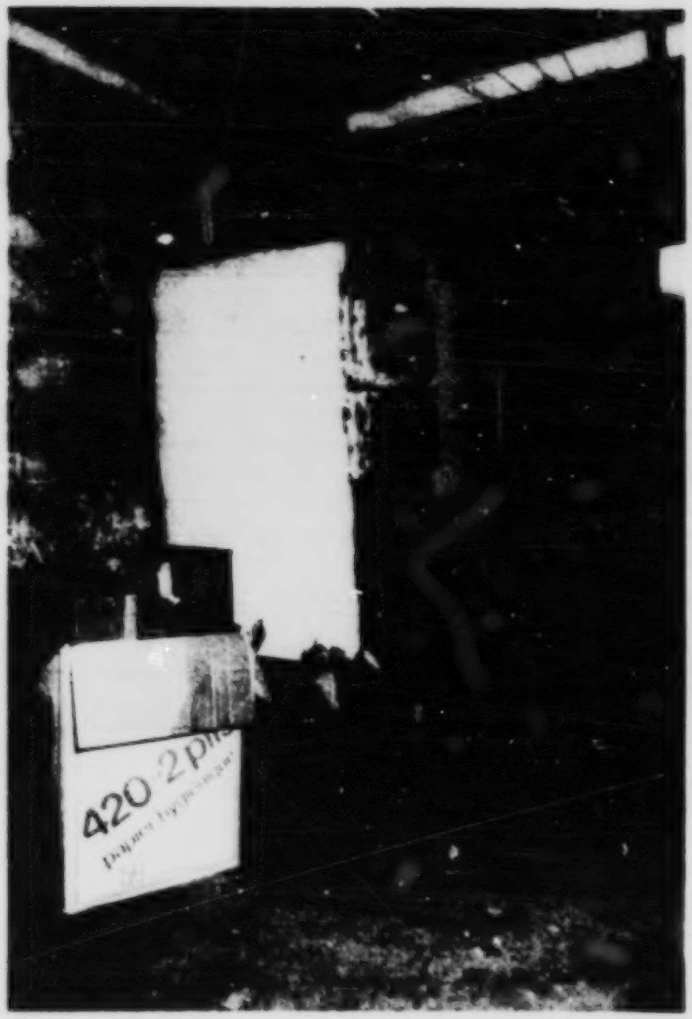
Increase in electrical consumption for space heating
since tune-up = 26.27%

HOUSE 18



HOUSE 18

COAL BOILER CONVERTED TO OIL



HEATING SYSTEM AND RETROFIT SUMMARY REPORT

HOUSE # 18 **ENERGY SOURCE-** Oil

BUILDING DESCRIPTION - TYPE Two storey

SIZE 167 M^2

INSULATION Walls none, ceiling some?

OCCUPANTS **FAMILY SIZE** 2

HABITS Uses supplemental wood stove and kerosine heater.

COMFORT COMPLAINTS None

BOILER - TYPE Dominion coal conversion w/Conroy Burner

AGE 15 Yrs.+ **SYSTEM CONDITION** Furnace requires at least another ½ day of cleaning.

	BEFORE	AFTER
COMBUSTION TEST RESULTS -		
EFFICIENCY -	62%	62%
NET STACK TEMP -	393°C	393°C

COMMENTS Has put foil behind some rads

Doesn't like natural gas

FUEL RECORD ANALYSIS Average kw/degree day before

tune-up = 12.52

Kw/degree day after tune-up = 16.8

Increase in oil consumption since tune-up = 34.2%

* Owner uses kerosene heater and wood stove, both of which could influence results.

RETROFIT OPPORTUNITIES & COSTS

HOUSE 18

Annual cost of heating oil is $1900.

A) **Further Heat Exchanger Cleaning-** Owner had this work done.

B) **Vent Damper-** Installed cost is $450. Annual savings would be 9%, or $171, providing a 2.6 year payback.

* C) **Outdoor Controller-** Installed cost would be $350. Expected savings are 9%, or $171, providing a payback period of 2.4 years.

D) **High Efficiency Burner-** Installed cost is $900. Annual savings would be 15%, or $285, providing a payback period of 3.2 years.

E) **High Efficiency Burner and Outdoor Controller-** Installed cost would be $1250. Expected annual savings are 18%, or $342, providing a 3.7 year payback.

F) **High Efficiency Burner and Flue Damper-** Installed cost is $1350. Savings would be 17%, or $323, providing a 4.2 year payback.

* Recommended Option

HYDRONIC HOUSE 18

Oil consumption during the 1981/1982 heating season =

4487 L = 48594.21 kW

Applicable degree days = 4062.6

Kw/degree day = 11.96

Oil consumption during the 1982/1983 heating season =

3872 L = 41933.76 kW

Applicable degree days = 3270.4

kW/degree day = 12.82

Oil consumption during the 1983/1984 heating season =

3222 L = 34894.26 kW

Applicable degree days = 2732.5

Kw/degree day = 12.77

Average kW/degree day before tune-up = 12.52

Tune-up date - March 6/84.

Oil consumed between March 17/84 and May 10/84 =

1037 L = 11230.7 kW

Applicable degree days = 668.6

kW/degree day after tune-up = 16.8

Increase in oil consumption since tune-up = 34.21%

REVISED CHECK LISTS

TOTAL TUNE-UP

ELECTRIC HYDRONIC TUNE-UP

CHECK LIST.

Homeowner's Name____

Address________________________________W/O#______________

Phone: Res.___________Bus.___________Date Of Visit___________

/By___________ Time Arrived__________Time Out___________

Thermostat A Location OK ( ) Poor ( )
B Type______________________________________

Check Anticipator & Adjust If Necessary. Adjusted? Yes ( ) No ( )

Comments____

Brief Shell Check Age Of House___ Fireplace? Yes ( ) No ( )
Damper? Yes ( ) No ( )

Windows - Type____________________________Open?____ Closed?____

Doors - _________________________Insulation Levels?____________

Brief Distribution System Check

Check Radiators - Sufficient? Yes ( ) No ( )

Comments____

Bleeders Present Yes ( ) No ( )

Radiator Type - Iron ( ) Steel ( ) Convectors ( )

Bled Rads? Yes No Air Present? Yes ( ) No ( )

Open System ( ) Closed System ( ) Water Heater Fuel________

Visual Check Of Distribution System Okay ( ) Poor ( )

Note Deficiencies____

Homeowner Comfort Problems___________________________________

____

Boiler Make________________________________Model______________

Input Rating____________

Turn-up Thermostat.

Complete Following Test

Boiler Temp.________

Check Air Cushion Tank & Recharge If Necessary - OK (   )
Recharged (   )

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments - ____

Check Safety Devices____________________________________

Lower Thermostat To Original Setting

Initial Aquastat Temp. Settings?___ON___OFF. Adjust to 100°F.

SUGGESTED IMPROVEMENTS

Setback thermostat (?)__________________________________

____

New Radiators____

____

____

Valve and or piping changes_____________________________

____

____

Repairs (?)____

____

Other____

____

Owners estimated annual space heating cost? $______________

TOTAL TUNE-UP

GAS HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name ______________________________

Address ______________________________ W/O# ____________

Phone: Res. ____________ Bus. ____________ Date Of Visit ____________

/By ____________ Time Arrived ____________ Time Out ____________

Thermostat A Location OK ( ) Poor ( )
B Type ______________________________
Check Anticipator & Adjust If Necessary. Adjusted? Yes ( ) No ( )

Comments ______________________________

Brief Shell Check Age Of House ______ Fireplace? Yes ( ) No ( )
Damper? Yes ( ) No ( )

Windows - Type ______________________________ Open? ____ Closed? ____

Doors - ______________________________ Insulation Levels? ____________

Brief Distribution System Check

Check Radiators - Sufficient? Yes ( ) No ( )

Comments ______________________________
Bleeders Present Yes ( ) No ( )

Radiator Type - Iron ( ) Steel ( ) Convectors ( )

Bled Rads? Yes No Air Present? Yes ( ) No ( )

Open System ( ) Closed System ( ) Water Heater Fuel ________

Visual Check Of Distribution System Okay ( ) Poor ( )

Note Deficiencies ______________________________

Homeowner Comfort Problems ______________________________

____

Chimney - Masonry - Tile Lined ( ). Manufactured Type A ( )
No Liner ( ). Type B- ______________
Metal Liner ( ). Other ______________
State Condition & Recommendations ______________________________

____

Boiler Make________________________________Model_______________

Input Rating__________________Output Rating_________________

Turn-up Thermostat.

Complete Following Combustion Test

CO^2______% Room Temp._____ Stack Temp.______ Net Stack______

Efficiency______% Boiler Temp.____Actual Boiler Btuh___________

(A) (B) (C)
Heat Exchanger Condition - Clean Average Dirty

Clean Heat Exchanger If (B) or (C) Exists. Cleaned___Not Req'd.___

Check Combustion Chamber Condition - Good?___Poor?___Type_______

Comments____

Initial Metered Gas Input____________

Metered Input After Adjustment, If Any Adjustment Made__________

Check Air Cushion Tank & Recharge If Necessary - OK ( )
Recharged ( )

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments - ____

Complete Combustion Test Two And Record.

CO^2____% Room Temp.____ Stack Temp._____ Net Stack Temp.________

Efficiency_____% New Boiler Temp.____ New Boiler Btuh_______

% Efficiency Change After Tune-up______%

Is there sufficient combustion air? Yes ( ) No ( )

Comments____

Check Limit Switch. OK ( ) Replace ( )

Check Other Safety Devices_______________________________________

Lower Thermostat To Original Setting

Initial Aquastat Temp. Settings?___ON___OFF. Adjust to 100°F.

INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

Setback thermostat (?) ____________________

New Radiators ____________________

Valve and or piping changes ____________________

Chimney repairs ____________________

Repairs (?) ____________________

Other ____________________

Home owners estimated annual space heating cost $ __________

TOTAL TUNE-UP

OIL HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name ____________________

Address ____________________ W/O# __________

Phone: Res. __________ Bus. __________ Date Of Visit __________

/By __________ Time Arrived __________ Time Out __________

Thermostat A Location OK ( ) Poor ( )
B Type ____________________

Check Anticipator & Adjust If Necessary. Adjusted? Yes ( ) No ( )

Comments ____________________

Brief Shell Check Age Of House ___ Fireplace? Yes ( ) No ( )
Damper? Yes ( ) No ( )

Windows - Type ____________________ Open? ____ Closed? ____

Doors - ____________________ Insulation Levels? __________

Brief Distribution System Check

Check Radiators - Sufficient? Yes ( ) No ( )

Comments ____________________

Bleeders Present Yes ( ) No ( )

Radiator Type - Iron ( ) Steel ( ) Convectors ( )

Bled Rads? Yes No Air Present? Yes ( ) No ( )

Open System ( ) Closed System ( ) Water Heater Fuel ________

Visual Check Of Distribution System Okay ( ) Poor ( )

Note Deficiencies ____________________

Homeowner Comfort Problems ____________________

____

Chimney - Masonry - Tile Lined ( ). No Liner ( ). Metal Liner ( ). Manufactured Type A ( ) Other - ____________

State Condition & Recommendations ________________________________

____

Boiler Make ______________________ Model ____________

Complete Following Combustion Test

Test 2 is conducted after all tune-up procedures have been completed.

COMBUSTION TEST PROCEDURE & INSPECTION DATA

1) Flame Ignit.-Instant ( )( )
Delayed ( )( )
No Ignition ( )( )

2) Flame Colour (If flame in 2 Colours check both)
Orange ( )( )
Yellow ( )( )
White ( )( )
Sparks ( )( )

3) Flame Shape
Uniform ( )( )
Lop-Sided ( )( )

4) Flame Impingement
At Bottom ( )( )
At Sides ( )( )
At Rear ( )( )

5) Soot Deposit
Flue ( )( )
Comb.Chamber ( )( )

6) Over Fire Draft In W.C. ( )( )

7) Flue Gas Temp .( )( )

8) Basement Air Temp. ( )( )

9) Net Stack Temp. (7-8) ( )( )

10) Flue Draft in. of W.C. ( )( )

11) % C.O.2 ( )( )

12) Smoke Reading# ( )( )

13) % Combustion Efficiency ( )( )

14) Oil Pressure (PSI) ( )( )

15) Nozzle-Size ( )( )
Type ( )( )
Spray Ang. ( )( )

Heat Exchanger Condition - (A) Clean (B) Average (C) Dirty

Clean Heat Exchanger If (B) or (C) Exists. Cleaned___ Not Req'd.___

Check Combustion Chamber Condition - Good?___ Poor?___ Type_______

Comments ____

Boiler Btuh ____

Check Air Cushion Tank & Recharge If Necessary - OK (   )
Recharged (   )

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments - ____

____

Initial Aquastat Temp. Settings?___On ___Off. Adjust to 100 °F.

Complete Combustion Test Two And Record on page 2.

New Boiler Btuh?____________% Improvement____________________

Is there sufficient combustion air? Yes (   )   No (   )

Comments____

Check Relay Safety Lockout______________________Seconds On?____

Check Limit Switch OK (   )   Replace (   )

Lower Thermostat To Original Setting

INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?)__________________________________

____

____

Flame retention head kit (?)____________________________

____

New burner (?)____

____

____

Flue damper (?)____

Gas conversion burner (?)________________________________

Chimney cleaning (?)___________________________________

Repairs (?)____

Other____

Owners estimated annual space heating cost?________________

FIELD NOTES

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name ______ House # 1

Address ______ , BRAMPTON ______

Phone ______ Visit Date JAN 20/84

Water Heater Fuel GAS Clothes Dryer Fuel ELECTRIC

Thermostat- Location OK - FRONT DOOR FAIRLY CLOSE

- Make GENERAL CONTROLS Type RECTANGULAR-STD.
- Comments LEAVES FRONT DOOR OPEN, FOR LIGHT
- Anticipator Present NO Owner Sets Back? NO
- Normal Setting- Day 68° 70°F Night SAME
- Thermostat Habits LEAVE

Comfort Problems? NO COMFORT PROBLEMS

Boiler Make IDEAL APCO ROBERT GORDON CONV. GAS BURNER Model CONVERTED COAL

Fuel GAS Input Rating MAX 210,000 Output Rating ?

Boiler Age 43 YRS Pump on Continuous Run? YES

Date Of Last Cleaning Or Tune-up? JAN. 24/83

Visual Check of Distribution System and Radiators CAST IRON,
DRAIN EXPANSION TANK

Basement Temperature OK Comments ______

Windows MOST STORMED - Opens WHEN SLEEPING

Doors FRONT DOOR KEPT OPEN House Age 43 YRS

House Size 2500 sq ft. Style 2 STORIES

Insulation- Walls ? , R14 IN ADDITION Ceiling R28

# of Occupants? 4 Unusual Setback Periods NONE

Fireplace? YES 2 , USE

Other Comments PAID $1194 FOR GAS LAST YR. PREFER MORNING TUNE-UP APPOINTMENT.

(1)

TOTAL TUNE-UP

GAS HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name______________________________

Address______________________________ W/O#______________

Phone: Res.________ Bus.______________ Date Of Visit APRIL 26/84

/By______________ Time Arrived______________ Time Out______________

Thermostat A Location OK (X) Poor ( )
B Type______________________________

Check Anticipator & Adjust If Necessary. Adjusted? Yes ( ) No (X)

Comments NO ANTICIPATOR

Brief Shell Check Age Of House 43 Fireplace? Yes (✓) No ( )
Damper? Yes (✓) No ( )

Windows - Type MOST STORMED Open? YES Closed?______

Doors - FRONT DOOR KEPT OPEN Insulation Levels? ?

Brief Distribution System Check

Check Radiators - Sufficient? Yes (X) No ( )

Comments______________________________

Bleeders Present Yes (X) No ( ) Valves? Yes ( ) No (✓)

Radiator Type - Iron (X) Steel ( ) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes (X) No ( )

Open System ( ) Closed System (X) Water Heater Fuel GAS

Visual Check Of Distribution System Okay (X) Poor ( )

Note Deficiencies______________________________

Homeowner Comfort Problems NONE

____

Chimney - Masonry - Tile Lined (X). Manufactured Type A ( )
No Liner ( ). Type B-______________
Metal Liner ( ). Other______________

State Condition & Recommendations______________________________

INACCESSABLE FOR CHECKING.

Boiler Make IDEAL CO-4L w/ ROBERT GORDON Model CONV. BURNER

Input Rating 127,200 Output Rating NA

Recharge Air Cushion Tank and indicate if done RECHARGED

Turn-up Thermostat.

Complete Following Combustion Test

CO2 8.2 % Room Temp.____ Stack Temp.____ Net Stack 307

Efficiency 82.5 % Boiler Temp.____ Actual Boiler Btuh 104,900

Heat Exchanger Condition - [✓ (A) Clean] (B) Average (C) Dirty

Clean Heat Exchanger If (B) or (C) Exists. Cleaned___ Not Req'd. X

Check Combustion Chamber Condition - Good? X Poor?___ Type____

Comments______

Initial Metered Gas Input 127,200
Metered Input After Adjustment, If Any Adjustment Made NONE
Check Air Cushion Tank & Recharge If Necessary - OK ( )
Recharged (X)

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments - ______

Complete Combustion Test Two And Record.

CO2 8.2 % Room Temp.____ Stack Temp.____ Net Stack Temp. 307

Efficiency 82.5 % New Boiler Temp.____ New Boiler Btuh 104,900

% Efficiency Change After Tune-up 0 %
Is there sufficient combustion air? Yes (X) No ( )

Comments______
Check Limit Switch. OK ( ) Replace ( ) SERVICE MAN FAILED TO INDICATE

Check Other Safety Devices______

Lower Thermostat To Original Setting

Initial Aquastat Temp. Settings?___ON___OFF. Adjust to [✓ 100°F.]

USE OTHER SIDE TO INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?)__________________________________

New Radiators_______________________________________

Valve and or piping changes____________________________

Chimney repairs_____________________________________

Repairs (?)____

Other____

Home owners estimated annual space heating cost $____________

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name ________ House # 2

Address BRAMPTON

Phone ________ Visit Date FEB.1/84

Water Heater Fuel ELECTRIC Clothes Dryer Fuel —

Thermostat- Location SUN COULD HIT THERMOSTAT

- Make HONEYWELL Type OLD BI-MATALIC
- Comments ________
- Anticipator Present NO Owner Sets Back? NO
- Normal Setting- Day 70°F Night 70°F
- Thermostat Habits LEAVES ALONE

Comfort Problems? NONE. LEAVES RADS UPSTAIRS TURNED OFF EXCEPT IN BATHROOM

Boiler Make ARCO IDEAL Model CONVERTED COAL ABC BURNER

Fuel OIL Input Rating ? Output Rating ?

Boiler Age 23+ Pump on Continuous Run? NO

Date Of Last Cleaning Or Tune-up? LAST SUMMER

Visual Check of Distribution System and Radiators CAST IRON BLEEDS RAD. PRESSURE APPEARS A LITTLE HIGH

Basement Temperature OK Comments ________

Windows STORMS Opens YES

Doors STORM DOORS House Age 85 YRS

House Size -1248 Style 2 STORY

Insulation- Walls NONE Ceiling R28

# of Occupants? 2 Unusual Setback Periods NO

Fireplace? NO

Other Comments ________

②

TOTAL TUNE-UP

OIL HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name HOUSE 2

Address W/O#

Phone: Res. Bus. Date Of Visit APRIL 27/84

/By Time Arrived Time Out

Thermostat A Location OK ( ) Poor (x)
B Type SUN MAY HIT

Check Anticipator & Adjust If Necessary. Adjusted? Yes ( ) No (x)

Comments NO ANTICIPATOR

Brief Shell Check Age Of House 85 Fireplace? Yes ( ) No (x)
Damper? Yes ( ) No ( )

Windows - Type STORMED Open? YES Closed?

Doors - STORMED Insulation Levels? CEILING R28 WALLS NONE

Brief Distribution System Check

Check Radiators - Sufficient? Yes ( ) No (x)

Comments NO RADS IN SOME ROOMS ON 2nd FLOOR.

Bleeders Present Yes (✓) No ( ) Valves? Yes ( ) No ( )

Radiator Type - Iron (✓) Steel ( ) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes ( ) No (x)

Open System ( ) Closed System (x) Water Heater Fuel ELECTRIC

Visual Check Of Distribution System Okay ( ) Poor (x)

Note Deficiencies INSUFFICIENT RADS

Homeowner Comfort Problems NONE - OWNER HAS SHUT-OFF ALL UPSTAIRS RADS

Chimney - [✓ Masonry] - Tile Lined ( ). Manufactured Type A ( )
No Liner ( ). Other - ______
Metal Liner ( ).

State Condition & Recommendations NOT ACCESSIBLE FOR CHECKING

Boiler Make ARCO IDEAL - COAL CONV. Model ABC BURNER

Complete Following Combustion Test

Test 2 is conducted after all tune-up procedures have been completed.

COMBUSTION TEST PROCEDURE & INSPECTION DATA

1) Flame Ignit.-Instant ( )( )
Delayed ( )( )
No Ignition ( )( )

2) Flame Colour (If flame in 2 Colours check both)
Orange ( )( )
Yellow ( )( )
White (x)(x)
Sparks ( )( )

3) Flame Shape
Uniform (x)(x)
Lop-Sided ( )( )

4) Flame Impingement
At Bottom ( )( )
At Sides (x)(x)
At Rear (x)(x)

5) Soot Deposit
Flue ( )( )
Comb.Chamber ( )( )

6) Over Fire Draft In W.C. ( )( )

7) Flue Gas Temp . ( )( )

8) Basement Air Temp. ( )( )

9) Net Stack Temp. (7-8) (462)(462)

10) Flue Draft in. of W.C. (.02)(.02)

11) % C.O.2 (7.0)(7.0)

12) Smoke Reading# (2)(2)

13) % Combustion Efficiency (75.2)(75.2)

14) Oil Pressure (PSI) ( )( )

15) Nozzle-Size (1.-)(1.-)
Type ( )( )
Spray Ang. ( )( )

Recharge air cushion tank and indicate if done YES

Heat Exchanger Condition - [✓ (A) Clean] (B) Average (C) Dirty

Clean Heat Exchanger If (B) or (C) Exists. Cleaned ___ Not Req'd. x

Check Combustion Chamber Condition - Good? x Poor? ___ Type ______

Comments ______

Boiler Btuh 131,600

Check Air Cushion Tank & Recharge If Necessary - OK ( )
Recharged (✓)

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments -

Initial Aquastat Temp. Settings?___On ___Off. Adjust [✓ to 100 °F.]

Complete Combustion Test Two And Record on page 2.

New Boiler Btuh? same % Improvement 0

Is there sufficient combustion air? Yes (X) No ( )

Comments

Check Relay Safety Lockout________Seconds On?____

Check Limit Switch OK ( ) Replace ( ) ?

SERVICE MAN FAILED TO RECORD

Lower Thermostat To Original Setting

INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?)

Flame retention head kit (?)

New burner (?)

Flue damper (?)

Gas conversion burner (?)

Chimney cleaning (?)

Repairs (?)

Other PUMP RUNS ONLY WHEN BURNER ON. SHOULD BE RE-WIRED.

Owners estimated annual space heating cost?

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name ______ House # 3

Address , BRAMPTON

Phone ______ Visit Date JAN 26/84

Water Heater Fuel ELECTRIC Clothes Dryer Fuel —

Thermostat- Location OK

- Make HONEYWELL Type NEW
- Comments OK
- Anticipator Present YES Owner Sets Back? ?
- Normal Setting- Day 20°C Night ?
- Thermostat Habits ______

Comfort Problems? DINING ROOM COOL

Boiler Make GURNEY - COAL CONV. Model 131-6-W

Fuel OIL Input Rating 1.5 Output Rating ______

Boiler Age 46 Pump on Continuous Run? NO

Date Of Last Cleaning Or Tune-up? LAST YEAR

Visual Check of Distribution System and Radiators ______

Basement Temperature OK Comments ______

Windows PLASTIC STORMS Opens ?

Doors STORMED House Age 46

House Size 2600 sq ft Style 2 STORY

Insulation- Walls NONE EXCEPT BASEMENT Ceiling R20 TO R28?

# of Occupants? 7 Unusual Setback Periods ______

Fireplace? ONE IN BASEMENT - USED

Other Comments USES REFLECTORS

(3)

TOTAL TUNE-UP

OIL HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name HOUSE (3)

Address , BRAMPTON W/O#

Phone: Res. Bus. Date Of Visit MAR. 25/84

/By Time Arrived Time Out

Thermostat A Location OK (✓) Poor ( )
B Type HONEYWELL NEW - LINE VOLTAGE CONTROLLING PUMP.

Check Anticipator & Adjust If Necessary. Adjusted? Yes ( ) No (✓)

Comments

Brief Shell Check Age Of House 46 Fireplace? Yes (✓) No ( )
Damper? Yes (✓) No ( )

Windows - Type STORMED Open? ? Closed? ?

Doors - STORMED Insulation Levels? NONE IN WALLS R 20 IN ATTIC

Brief Distribution System Check

Check Radiators - Sufficient? Yes (✓) No ( )

Comments INSTALLED REFLECTORS

Bleeders Present Yes (✓) No ( ) Valves? Yes (✓) No ( )

Radiator Type - Iron (✓) Steel ( ) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes ( ) No (✓)

Open System ( ) Closed System (✓) Water Heater Fuel ELECTRIC

Visual Check Of Distribution System Okay (✓) Poor ( )

Note Deficiencies

Homeowner Comfort Problems NONE

Chimney - Masonry - Tile Lined (✓). Manufactured Type A ( )
No Liner ( ). Other - ____________
Metal Liner ( ).
State Condition & Recommendations OK

Boiler Make ____________ Model ____________

Complete Following Combustion Test

Test 2 is conducted after all tune-up procedures have been completed.

COMBUSTION TEST PROCEDURE & INSPECTION DATA

1) Flame Ignit.-Instant (✓)(✓)
Delayed ( )( )
No Ignition ( )( )

2) Flame Colour (If flame in 2 Colours check both)
Orange ( )( )
Yellow (✓)(✓)
White ( )( )
Sparks ( )( )

3) Flame Shape Uniform (✓)(✓)
Lop-Sided ( )( )

4) Flame Impingement
At Bottom ( )( )
At Sides ( )( )
At Rear ( )( )

5) Soot Deposit Flue (✓)(✓)
Comb.Chamber (✓)(✓)

6) Over Fire Draft In W.C. (—)(—)

7) Flue Gas Temp (—)(—)

8) Basement Air Temp. (—)(—)

9) Net Stack Temp. (7-8) (404)(404)

10) Flue Draft in. of W.C. (.03)(.03)

11) % C.O.2 (6.5)(7.2)

12) Smoke Reading# (0)(0)

13) % Combustion Efficiency (70)(78)

14) Oil Pressure (PSI) ( )( )

15) Nozzle-Size (1.5)(1.5)
Type (80)(90)
Spray Ang. ( )( )

Recharge air cushion tank and indicate if done YES

Heat Exchanger Condition - (A) Clean [✓ (B) Average] (C) Dirty

Clean Heat Exchanger If (B) or (C) Exists. Cleaned ✓ Not Req'd. ___

Check Combustion Chamber Condition - Good? ✓ Poor? ___ Type ______

Comments ________________________

Boiler Btuh 147,000

Check Air Cushion Tank & Recharge If Necessary - OK ( )
Recharged (✓)

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments -

Initial Aquastat Temp. Settings?___On ___Off. Adjust to 100 °F.

Complete Combustion Test Two And Record on page 2.

New Boiler Btuh? 163,800 % Improvement +11.4 %

Is there sufficient combustion air? Yes (✓) No ( )

Comments

Check Relay Safety Lockout________ Seconds On?____

Check Limit Switch OK ( ) Replace ( )

SERVICEMAN FAILED TO COMPLETE

Lower Thermostat To Original Setting

INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?) SHOULD INSTALL

Flame retention head kit (?)

New burner (?)

Flue damper (?)

Gas conversion burner (?)

Chimney cleaning (?)

Repairs (?)

Other BURNER CYCLING ON LIMIT. PUMP CYCLING WITH STAT.

SHOULD BE CHANGED TO OPERATE BURNER WITH STAT & PUMP SET TO CONTINUOUS RUN.

COULD USE INDOOR/OUTDOOR CONTROLER

Owners estimated annual space heating cost?

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name ______ House # 4

Address ______

Phone ______ Visit Date JAN 25-/86

Water Heater Fuel ELECTRIC Clothes Dryer Fuel ELECTRIC

Thermostat- Location OK

- Make HONEYWELL Type ROUND
- Comments ANTICIPATOR .5
- Anticipator Present YES Owner Sets Back? ______
- Normal Setting- Day 67° Night 67°
- Thermostat Habits LEAVES IT ALONE

Comfort Problems? ______

Boiler Make PEASE FOUNDRY CONVERTED COAL Model ECONOMY BOILER

Fuel OIL Input Rating 1.25 NOZZLE Output Rating ______

Boiler Age 68 Pump on Continuous Run? ______

Date Of Last Cleaning Or Tune-up? FALL 83

Visual Check of Distribution System and Radiators BLEED RADS NEEDS REFLECTORS. CHECK AMOUNT OF WATER IN SYSTEM

Basement Temperature ______ Comments ______

Windows STORMED Opens OO

Doors NO STORM House Age 68

House Size 3000 Style 2 STORY

Insulation- Walls NONE Ceiling R20

# of Occupants? 2 Unusual Setback Periods NO

Fireplace? YES USES

Other Comments ______

CHECK SEPARATE HUMIDIFIER SYSTEM --- BLOCK OFF IF OPEN

4

TOTAL TUNE-UP

OIL HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name HOUSE 4

Address BRAMPTON W/O#

Phone: Res. Bus. Date Of Visit APRIL 25/84

/By Time Arrived Time Out

Thermostat A Location OK (X) Poor ( )
B Type

Check Anticipator & Adjust If Necessary. Adjusted? Yes ( ) No (X)

Comments O.K.

Brief Shell Check Age Of House 68 Fireplace? Yes (✓) No ( )
Damper? Yes (✓) No ( )

Windows - Type STORMED Open? YES Closed?

Doors - NO STORMS Insulation Levels? WALLS NONE
CEILING R20

Brief Distribution System Check

Check Radiators - Sufficient? Yes (✓) No ( )

Comments

Bleeders Present Yes (X) No ( ) Valves? Yes (✓) No ( )

Radiator Type - Iron (X) Steel ( ) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes (✓) No ( )

Open System ( ) Closed System (X) Water Heater Fuel ELECTRIC

Visual Check Of Distribution System Okay (X) Poor ( )

Note Deficiencies

Homeowner Comfort Problems NONE

Chimney - Masonry - Tile Lined (x). Manufactured Type A ( )
No Liner ( ). Other - ____________
Metal Liner ( ).

State Condition & Recommendations NOT ACCESSABLE FOR CHECKING.

Boiler Make PEASE COAL CONERSION Model ECONOMY BOILER

Complete Following Combustion Test

Test 2 is conducted after all tune-up procedures have been completed.

COMBUSTION TEST PROCEDURE & INSPECTION DATA

1) Flame Ignit.-Instant (x)(x)
Delayed ( )( )
No Ignition ( )( )

2) Flame Colour (If flame in 2 Colours check both)
Orange ( )( )
Yellow (x)(x)
White (x)(x)
Sparks ( )( )

3) Flame Shape
Uniform (x)( )
Lop-Sided ( )( )

4) Flame Impingement
At Bottom ( )( )
At Sides ( )( )
At Rear ( )( )

5) Soot Deposit
Flue ( )( )
Comb.Chamber ( )( )

6) Over Fire Draft In W.C. ( )( )

7) Flue Gas Temp .( )( )

8) Basement Air Temp. ( )( )

9) Net Stack Temp. (7-8) (333)(333)

10) Flue Draft in. of W.C. (.04)(.04)

11) % C.O.2 (5)(5)

12) Smoke Reading# (2)(2)

13) % Combustion Efficiency (76)(76)

14) Oil Pressure (PSI) ( )( )

15) Nozzle-Size (1.0)(1.0)
Type ( )( )
Spray Ang. ( )( )

Recharge air cushion tank and indicate if done NOT ACCESSABLE

Heat Exchanger Condition - (A) Clean [✓ (B) Average] (C) Dirty

Clean Heat Exchanger If (B) or (C) Exists. Cleaned___ Not Req'd. X

Check Combustion Chamber Condition - Good? X Poor?___ Type BRICK

Comments____________

Boiler Btuh 106,400

Check Air Cushion Tank & Recharge If Necessary - OK (X)
Recharged ( )

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments -

Initial Aquastat Temp. Settings? ___On ___Off. Adjust to 100 °F. CONTINUOUS RUN

Complete Combustion Test Two And Record on page 2.

New Boiler Btuh? 106,400 % Improvement 0

Is there sufficient combustion air? Yes (X) No ( )

Comments

Check Relay Safety Lockout ______ Seconds On? ___

Check Limit Switch OK ( ) Replace ( )

SERVICE-MAN FAILED TO RECORD

Lower Thermostat To Original Setting

INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?)

Flame retention head kit (?)

New burner (?)

Flue damper (?)

Gas conversion burner (?)

Chimney cleaning (?)

Repairs (?) REQUIRES NEW BAROMETRIC DAMPER

Other

Owners estimated annual space heating cost?

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name________ House # 5

Address________

Phone________ Visit Date JAN 20/84

Water Heater Fuel GAS Clothes Dryer Fuel ———

Thermostat- Location OK.

- Make DYNAMIC ELECTRIC THERMOGAURD Type LIGHT SET BACK
- Comments SOLID STATE
- Anticipator Present YES Owner Sets Back? YES
- Normal Setting- Day 72°F Night 69°F
- Thermostat Habits LEAVES

Comfort Problems? NONE

Boiler Make HI-T STEEL BOILER Model WAS AN OIL BOILER ECONOMITE E20 BOILER

Fuel GAS Input Rating ? Output Rating ?.

Boiler Age 33 YRS Pump on Continuous Run? TIMER HOLDS PUMP ON FOR 30 MINUTES

Date Of Last Cleaning Or Tune-up? 2 YRS

Visual Check of Distribution System and Radiators STEEL RADS HAS AUTOMATIC BLEEDERS -10-15 YRS OLD - BLEED & CHECK

Basement Temperature OK Comments________

Windows MOST Opens YES AT NIGHT

Doors STORM House Age 33

House Size 1800 Sq ft Style 1½ STORY

Insulation- Walls NONE Ceiling R28

# of Occupants? 2 Unusual Setback Periods ONCE/YR TO 60° END FEB. TO MID MAR.

Fireplace? 2 - YES - SOMETIMES USE

Other Comments________

5

TOTAL TUNE-UP

GAS HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name B - 5

Address BRAMPTON W/O#

Phone: Res. Bus. Date Of Visit FEB. 22/84

/By Time Arrived Time Out

Thermostat A Location OK (✓) Poor ( )
B Type LIGHT SENSITIVE SETBACK

Check Anticipator & Adjust If Necessary. Adjusted? Yes ( ) No (✓)

Comments

Brief Shell Check Age Of House 50 Fireplace? Yes (✓) No ( )
Damper? Yes (✓) No ( )

Windows - Type STORMED Open? Closed?

Doors - STORMED Insulation Levels? WALLS NONE
CEILING R24

Brief Distribution System Check

Check Radiators - Sufficient? Yes (✓) No ( )

Comments

Bleeders Present Yes (✓) No ( ) Valves? Yes ( ) No ( )

Radiator Type - Iron ( ) Steel ( ) Convectors (✓)

Bleed Rads If Req'd. Air Present? Yes ( ) No (✓)

Open System ( ) Closed System (✓) Water Heater Fuel

Visual Check Of Distribution System Okay (✓) Poor ( )

Note Deficiencies NONE

Homeowner Comfort Problems

Chimney - Masonry - Tile Lined ( ). Manufactured Type A ( )
No Liner ( ). Type B- ✓
Metal Liner ( ). Other

State Condition & Recommendations ok ?

Boiler Make Hi T. STEEL Model GAS ECONOMITE E20

Input Rating 200,000 MAX Output Rating______

Recharge Air Cushion Tank and indicate if done______

Turn-up Thermostat.

Complete Following Combustion Test

CO^2 8.5 % Room Temp.____ Stack Temp.____ Net Stack 252

Efficiency 84.2 % Boiler Temp.____ Actual Boiler Btuh______

Heat Exchanger Condition - (A) Clean (B) Average [✓ (C) Dirty]

Clean Heat Exchanger If (B) or (C) Exists. Cleaned ✓ Not Req'd.___

Check Combustion Chamber Condition - Good?___ Poor? ✓ Type FIREBRICK

Comments HEAT EXCHANGER WAS 75% PLUGGED

Initial Metered Gas Input______
Metered Input After Adjustment, If Any Adjustment Made______
Check Air Cushion Tank & Recharge If Necessary - OK (✓)
Recharged ( )

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments - ______

Complete Combustion Test Two And Record.

CO^2 ~~8.5~~ 9.2 % Room Temp.____ Stack Temp.____ Net Stack Temp. 228

Efficiency 84.2 % New Boiler Temp.____ New Boiler Btuh______

% Efficiency Change After Tune-up 0 %
Is there sufficient combustion air? Yes (✓) No ( )

Comments______
Check Limit Switch. OK (✓) Replace ( )

Check Other Safety Devices______

Lower Thermostat To Original Setting

Initial Aquastat Temp. Settings?___ON___OFF. Adjust to 100°F.
PUMP OFF 20 MIN. AFTER BURNER SHUT -- BECAUSE HOME OVER SHOOTS IN TEMPERATURE

USE OTHER SIDE TO INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?)

New Radiators

Valve and or piping changes

Chimney repairs COMBUSTION CHAMBER SHOULD BE RELINED

Repairs (?)

Other INSTALL INDOOR/OUTDOOR CONTROL.

Home owners estimated annual space heating cost $

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name House # 6

Address , BRAMPTON , ,

Phone Visit Date JAN. 24/84

Water Heater Fuel ELECTRIC Clothes Dryer Fuel —

Thermostat- Location GOOD

- Make HONEYWELL Type ROUND
- Comments
- Anticipator Present YES Owner Sets Back? NO
- Normal Setting- Day 18° Night 18°
- Thermostat Habits LEAVES ALONE

Comfort Problems? BASEMENT COLD

Boiler Make DOMINION RADIATOR Model

Fuel OIL Input Rating ? Output Rating

Boiler Age 47 Pump on Continuous Run? NO

Date Of Last Cleaning Or Tune-up? SEPT/82

Visual Check of Distribution System and Radiators BLEEDS RAD ONCE A WEEK UPSTAIRS

Basement Temperature Cool Comments

Windows STORMED Opens NO

Doors STORMED House Age 47 YRS

House Size 1200? Style STORY & 1/2

Insulation- Walls NONE Ceiling ATTIC R28

# of Occupants? 2 Unusual Setback Periods —

Fireplace? YES – USE

Other Comments BAROMETRIC DAMPER FALLEN OFF

6

TOTAL TUNE-UP

OIL HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name HOUSE [illegible]

Address BRAMPTON W/O#

Phone: Res. Bus. Date Of Visit MAR 22/84

/By Time Arrived Time Out

Thermostat A Location OK (✓) Poor ( )
B Type

Check Anticipator & Adjust If Necessary. Adjusted? Yes (✓) No ( )

Comments

Brief Shell Check Age Of House 50 Fireplace? Yes (✓) No ( )
Damper? Yes (✓) No ( )

Windows - Type STORMED Open? Closed? ✓

Doors - STORMED Insulation Levels? WALLS - NONE
ATTIC - R28

Brief Distribution System Check

Check Radiators - Sufficient? Yes (✓) No ( )

Comments

Bleeders Present Yes ( ) No ( ) Valves? Yes (✓) No ( )

Radiator Type - Iron ( ) Steel (✓) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes ( ) No (✓)

Open System ( ) Closed System (✓) Water Heater Fuel

Visual Check Of Distribution System Okay (✓) Poor ( )

Note Deficiencies

Homeowner Comfort Problems

Chimney - Masonry - Tile Lined ( ). Manufactured Type A ( )
No Liner (✓). Other - ______________
Metal Liner ( ).

State Condition & Recommendations ______________________________

____

Boiler Make DOMINION RADIATOR Model ______________

Complete Following Combustion Test

Test 2 is conducted after all tune-up procedures have been completed.

COMBUSTION TEST PROCEDURE & INSPECTION DATA

1) Flame Ignit.-Instant (✓)(✓)
Delayed ( )(✓)
No Ignition ( )( )

2) Flame Colour (If flame in 2 Colours check both)
Orange ( )( )
Yellow (✓)(✓)
White ( )( )
Sparks ( )( )

3) Flame Shape Uniform ( )(✓)
Lop-Sided ( )( )

4) Flame Impingement At Bottom ( )( )
At Sides ( )( )
At Rear ( )( )

5) Soot Deposit Flue (✓)(ok)
Comb.Chamber (✓)(ok)

6) Over Fire Draft In W.C. (–)(–)

7) Flue Gas Temp .( )( )

8) Basement Air Temp. ( )( )

9) Net Stack Temp. (7-8) (800)(800)

10) Flue Draft in. of W.C. ( )( )

11) % C.O.2 ( )( )

12) Smoke Reading# (10)(10)

13) % Combustion Efficiency (66)(66)

14) Oil Pressure (PSI) ( )( )

15) Nozzle-Size (?)(?)
Type (?)(?)
Spray Ang. ( )( )

BURNER HAS RUSTED ONTO BOILER

Recharge air cushion tank and indicate if done ______________

Heat Exchanger Condition - (A) Clean (B) Average [✓ (C) Dirty]

Clean Heat Exchanger If (B) or (C) Exists. Cleaned ___ Not Req'd. ___

Check Combustion Chamber Condition - Good? ✓ Poor? ___ Type ______

Comments ____

Boiler Btuh COULD NOT REMOVE BURNER TO CHECK NOZZLE

Check Air Cushion Tank & Recharge If Necessary - OK (✓)
Recharged ( )

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments - ____

Initial Aquastat Temp. Settings?___On ___Off. Adjust to [✓ 100 °F.]

Complete Combustion Test Two And Record on page 2.

New Boiler Btuh? NA % Improvement NA

Is there sufficient combustion air? Yes (✓) No ( )

Comments____

Check Relay Safety Lockout__________________Seconds On?_____ SERVICE-MAN FAILED TO RECORD

Check Limit Switch OK ( ) Replace ( ) ?

Lower Thermostat To Original Setting

INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?)__________________________________

Flame retention head kit (?)______________________________

New burner (?)____

Flue damper (?)

Gas conversion burner (?)

Chimney cleaning (?)

Repairs (?)

Other STACK CONTROL NOT WORKING PROPERLY. FURNACE REQUIRES MAJOR REPAIRS.

BOILER HEAT EXCHANGER REQUIRES EXTENSIVE CLEANING

Owners estimated annual space heating cost?

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name House # 7

Address , BRAMPTON

Phone Visit Date JAN 25/84

Water Heater Fuel ELECTRIC Clothes Dryer Fuel

Thermostat- Location OK

- Make HONEYWELL Type ROUND
- Comments
- Anticipator Present YES Owner Sets Back? YES
- Normal Setting- Day 24°C Night 20°C
- Thermostat Habits TURNS UP IF COLD OR WINDY

Comfort Problems? NORTH SIDE OF HOUSE COOL.
BATHROOM COLD & NORTH SPARE ROOM - CHECK RADS - COLD

Boiler Make Model

Fuel OIL Input Rating ? Output Rating

Boiler Age 2 YRS Pump on Continuous Run? NO

Date Of Last Cleaning Or Tune-up? FALL 1982

Visual Check of Distribution System and Radiators TURN ON
BATHROOM RAD

Basement Temperature COOL Comments NO RADS

Windows MOST STORMED Opens YES

Doors NOT STORMED House Age 125 YRS

House Size 2500 sq ft ?? Style TWO STORY

Insulation- Walls NONE Ceiling SOME?

# of Occupants? 2 Unusual Setback Periods NO

Fireplace? ONE

Other Comments DOESN'T LIKE GAS. / CHECK EXPANSION TANK, IT APPEARS TO BE EMPTY

7

TOTAL TUNE-UP

OIL HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name HOUSE 7

Address ____ W/O# ____

Phone: Res. ____ Bus. ____ Date Of Visit MARCH 7/84

/By ____ Time Arrived ____ Time Out ____

Thermostat A Location OK (✓) Poor ( )
B Type HONEYWELL ROUND

Check Anticipator & Adjust If Necessary. Adjusted? Yes (✓) No ( )

Comments ____

Brief Shell Check Age Of House 125 Fireplace? Yes (✓) No ( )
Damper? Yes (✓) No ( )

Windows - Type STORMED Open? ✓ Closed? ____

Doors - NOT STORMED Insulation Levels? WALLS NONE. SOME? IN ATTIC

Brief Distribution System Check

Check Radiators - Sufficient? Yes ( ) No (✓)

Comments FRONT NORTH BEDROOM HAS NO RADS INSTALLED REFLECTORS.

Bleeders Present Yes (✓) No ( ) Valves? Yes (No (x)

Radiator Type - Iron (✓) Steel ( ) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes (✓) No ( )

Open System ( ) Closed System (✓) Water Heater Fuel ELECTRIC

Visual Check Of Distribution System Okay (✓) Poor ( )

Note Deficiencies ____

Homeowner Comfort Problems UPSTAIRS BEDROOMS COOL.

Chimney - Masonry - Tile Lined ( ). No Liner (X). Metal Liner ( ). Manufactured Type A ( ) Other - ____

State Condition & Recommendations VERY POOR CONDITION. MASONRY DETERIORATING.

Boiler Make HYDRO THERM Model BN 210

Complete Following Combustion Test

Test 2 is conducted after all tune-up procedures have been completed.

COMBUSTION TEST PROCEDURE & INSPECTION DATA

1) Flame Ignit.-Instant (✓)(✓)
Delayed ( )( )
No Ignition ( )( )

2) Flame Colour* (If flame in 2 Colours check both)
Orange ( )( )
Yellow ( )( )
White ( )( )
Sparks ( )( )
* CANNOT SEE FLAME

3) Flame Shape
Uniform*( )( )
Lop-Sided ( )( )

4) Flame Impingement
At Bottom*( )( )
At Sides ( )( )
At Rear ( )( )

5) Soot Deposit
Flue (✓)( )
Comb.Chamber (✓)( )

6) Over Fire Draft In W.C. (.01)(.02)

7) Flue Gas Temp .(—)(—)

8) Basement Air Temp. (—)(—)

9) Net Stack Temp. (7-8) (685)(485)

10) Flue Draft in. of W.C. (.05(.05)

11) % C.O.2 (11.0(8.2)

12) Smoke Reading# (4)(2)

13) % Combustion Efficiency (75)(78)

14) Oil Pressure (PSI) (—)(—)

15) Nozzle-Size (1.25)(1.25)
Type (SOLID)(SOLID)
Spray Ang. (70°)(70°)

Recharge air cushion tank and indicate if done NOT REQ'D

Heat Exchanger Condition - (A) Clean (B) Average [✓ (C) Dirty]

Clean Heat Exchanger If (B) or (C) Exists. Cleaned X Not Req'd.___

Check Combustion Chamber Condition - Good?___ Poor? X Type BRICK

Comments BREAKING-UP. REPAIRED WITH PYROSEAL

Boiler Btuh 131,250

Check Air Cushion Tank & Recharge If Necessary - OK (✓)
Recharged ( )

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments - SOME VALUES ON SOME UPSTAIRS RADS
FROZED CANNOT OPEN OR ADJUST

Initial Aquastat Temp. Settings?___On ___Off. Adjust to [✓ 100 °F].

Complete Combustion Test Two And Record on page 2.

New Boiler Btuh? 136,500 % Improvement 4%

Is there sufficient combustion air? Yes (✓) No ( )

Comments______________________________

Check Relay Safety Lockout CHECKED & REPLACED Seconds On? 30

Check Limit Switch OK (✓) Replace ( )

Lower Thermostat To Original Setting

INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?)______________________________

Flame retention head kit (?)______________________________

New burner (?)______________________________

Flue damper (?) ______________________________

____

____

Gas conversion burner (?) ______________________________

____

____

Chimney cleaning (?) CHIMNEY NEEDS LINER

____

____

Repairs (?) ______________________________

____

____

Other BOILER WAS INSTALLED JAN/83.

____

____

____

____

____

____

____

____

____

____

Owners estimated annual space heating cost? ______________________________

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name House # 8

Address

Phone Visit Date FEB.1 / 11:30

Water Heater Fuel GAS SINCE DEC/83 Clothes Dryer Fuel ELECTRIC

Thermostat- Location OK

- Make WHITE ROGERS Type SETBACK
- Comments NEW
- Anticipator Present OK Owner Sets Back? YES
- Normal Setting- Day 20°C Night 60°F
- Thermostat Habits

Comfort Problems? MASTER BEDROOM COOL

Boiler Make GALAXY CAST IRON Model SLANT·FIN

Fuel GAS Input Rating 98 FT Output Rating 160,000 ?

Boiler Age 2 MOS. DEC 5/83 Pump on Continuous Run? YES

Date Of Last Cleaning Or Tune-up? NONE - NEW

Visual Check of Distribution System and Radiators BLEEDS RADS

CAST IRON RADS.

Basement Temperature COOL Comments OK

Windows Opens NO

Doors VERANDA ON FRONT House Age 35 YRS

House Size 1050 SQ FT Style BUNGALOW

Insulation- Walls NONE Ceiling 2½" BATTS

# of Occupants? 5 NOW, 6 SOON Unusual Setback Periods NO

Fireplace? NO

Other Comments CHIMNEY LINER PRESENT. NO OLD BILLS.

8

TOTAL TUNE-UP

GAS HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name HOUSE 8

Address W/O#

Phone: Res. Bus. Date Of Visit MARCH 6/84

/By Time Arrived Time Out

Thermostat A Location OK (✓) Poor ( )
B Type SETBACK

Check Anticipator & Adjust If Necessary. Adjusted? Yes (✓) No ( )

Comments

Brief Shell Check Age Of House 40 Fireplace? Yes ( ) No (✓)
Damper? Yes ( ) No ( )

Windows - Type MOST STORMED Open? Closed? ✓

Doors - STORMED Insulation Levels? WALLS NONE 2½" BATTS IN CEILING

Brief Distribution System Check

Check Radiators - Sufficient? Yes (✓) No ( )

Comments

Bleeders Present Yes (✓) No ( ) Valves? Yes (✓) No ( )

Radiator Type - Iron (✓) Steel ( ) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes ( ) No (✓)

Open System ( ) Closed System (✓) Water Heater Fuel GAS

Visual Check Of Distribution System Okay (✓) Poor ( )

Note Deficiencies

Homeowner Comfort Problems MASTER BEDROOM COOL

Chimney - Masonry - Tile Lined ( ). Manufactured Type A ( )
No Liner ( ). Type B- ✓
Metal Liner ( ). Other

State Condition & Recommendations OK

Boiler Make SLANT FIN Model GALAXY

Input Rating 100,000 Output Rating ____

Recharge Air Cushion Tank and indicate if done ____

Turn-up Thermostat.

Complete Following Combustion Test

CO^2 6.4 % Room Temp. ____ Stack Temp. ____ Net Stack 362

Efficiency 78.3 % Boiler Temp. ____ Actual Boiler Btuh ____

Heat Exchanger Condition - [✓ (A) Clean] (B) Average (C) Dirty

Clean Heat Exchanger If (B) or (C) Exists. Cleaned ____ Not Req'd. ✓

Check Combustion Chamber Condition - Good? ✓ Poor? ____ Type ____

Comments NEW UNIT

Initial Metered Gas Input ____
Metered Input After Adjustment, If Any Adjustment Made ____
Check Air Cushion Tank & Recharge If Necessary - OK (✓)
Recharged ( )

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments - NO BALANCING VALVES

Complete Combustion Test Two And Record.

CO^2 6.4 % Room Temp. ____ Stack Temp. ____ Net Stack Temp. 362

Efficiency 78.3 % New Boiler Temp. ____ New Boiler Btuh ____

% Efficiency Change After Tune-up 0 %
Is there sufficient combustion air? Yes ( ) No ( ) - SERVICEMAN FAILED TO RECORD

Comments ____
Check Limit Switch. OK (x) Replace ( )

Check Other Safety Devices SERVICEMAN FAILED TO RECORD

Lower Thermostat To Original Setting

Initial Aquastat Temp. Settings? 120 ON ____ OFF. Adjust to [✓ 100°F.]

USE OTHER SIDE TO INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?)

New Radiators RAD IN MASTER BEDROOM TOO SMALL.

Valve and or piping changes

Chimney repairs

Repairs (?)

Other SET AQUASTAT TO CONTINUOUS RUN

Home owners estimated annual space heating cost $

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name House # 9

Address BRAMPTON

Phone Visit Date JAN. 26/84

Water Heater Fuel ELECTRIC Clothes Dryer Fuel

Thermostat- Location OK

- Make SHELL CHRONOTHERM Type SET BACK
- Comments
- Anticipator Present YES Owner Sets Back? YES
- Normal Setting- Day 17° C Night 13 °C
- Thermostat Habits AUTOMATIC SET BACK

Comfort Problems? NONE

BASEMENT UNHEATED

Boiler Make CHROMOLOX Model

Fuel ELECTRIC Input Rating 15-20KW Output Rating

Boiler Age 1½ YRS NOV/82 Pump on Continuous Run? NO

Date Of Last Cleaning Or Tune-up? NEVER

Visual Check of Distribution System and Radiators CAST IRON RADS

HAS HONEYWELL OUT-SIDE CONTROLER

Basement Temperature COOL Comments UNHEATED

Windows STORM Opens NO

Doors " House Age 125 YRS

House Size 2700 W/APT. Style 2 STORY + UNHEATED ATTIC

Insulation- Walls NONE Ceiling R20 -R28

# of Occupants? 2 +1 Unusual Setback Periods NO

Fireplace? YES & USE

Other Comments SEPARATE APT, 200 AMP SERVICE
SUPPLEMENTAL BASEBOARD HEATERS

9

TOTAL TUNE-UP

ELECTRIC HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name ____________ HOUSE 9

Address ____________ W/O# ____________

Phone: Res. ____________ Bus. ____________ Date Of Visit ____________

/By ____________ Time Arrived ____________ Time Out ____________

Thermostat A Location OK (✓) Poor ( )
B Type ____________

Check Anticipator & Adjust If Necessary. Adjusted? Yes ( ) No ( )

Comments ____________

Brief Shell Check Age Of House 100 Fireplace? Yes (✓) No ( )
Damper? Yes (✓) No ( )

Windows - Type ____________ Open? ____ Closed? ____

Doors - ____________ Insulation Levels? ____________

Brief Distribution System Check

Check Radiators - Sufficient? Yes (✓) No ( )

Comments ____________

Bleeders Present Yes (✓) No ( ) Valves? Yes (✓) No ( )

Radiator Type - Iron (✗) Steel ( ) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes (✗) No ( )

Open System ( ) Closed System (✗) Water Heater Fuel ELECT.

Visual Check Of Distribution System Okay (✗) Poor ( )

Note Deficiencies NONE

Homeowner Comfort Problems NONE

____

Boiler Make CHROMOLUX Model ____________

Input Rating 20KW Recharge Air Cushion Tank & Indicate X

Turn-up Thermostat.

Complete Following Test

Boiler Temp.________

Check Air Cushion Tank & Recharge If Necessary - OK (✗)
Recharged (   )

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments - ____

Check Limit Switch.   OK (NA) Replace (   )

Check Other Safety Devices______________________________________

SERVICEMAN FAILED TO RECORD

Lower Thermostat To Original Setting

Initial Aquastat Temp. Settings? ✓ ON ✓ OFF. Adjust to 100°F. OK

SUGGESTED IMPROVEMENTS

Setback thermostat (?)____

____

New Radiators____

____

____

Valve and or piping changes____

____

____

Repairs (?)____

____

Other____

____

Owners estimated annual space heating cost? $_______________

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name ________ House # 10

Address ________

Phone ________ Visit Date JAN. 26/84

Water Heater Fuel ELECTRIC Clothes Dryer Fuel —

Thermostat- Location OK

- Make GENERAL CONTROL Type ________
- Comments NOT ACCURATE - ALIGN IF POSSIBLE
- Anticipator Present NO Owner Sets Back? YES
- Normal Setting- Day 70°F Night 65°F
- Thermostat Habits ________

Comfort Problems? NO RAD. IN ONE BEDROOM UPSTAIRS - COOL

Boiler Make GALAXY Model SLANTFIN

Fuel GAS Input Rating 79000 Output Rating ?

Boiler Age 4 YRS Pump on Continuous Run? ________

Date Of Last Cleaning Or Tune-up? ?

Visual Check of Distribution System and Radiators STEEL RADS

BLEED RADS AND RECHARGE EXPANSION TANK

Basement Temperature COOL Comments OK - UNUSED CELLAR

Windows STORMED Opens NO

Doors CLOSED PORCH House Age 100 YRS

House Size 1200 sq ft Style 2 STORY

Insulation- Walls NONE Ceiling R20-R28

# of Occupants? 5 Unusual Setback Periods NO

Fireplace? WOOD STOVE IN SEPARATE ROOM

Other Comments WATER UNDER BOILER FROM PRESSURE RELIEF VALVE

10

TOTAL TUNE-UP

GAS HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name_

Address , BRAMPTON W/O#

Phone: Res. Bus. Date Of Visit FEB. 21/84

/By Time Arrived Time Out

Thermostat A Location OK (✓) Poor ( )
B Type GENERAL CONTROL. CASE BROKEN · ALIGNED

Check Anticipator & Adjust If Necessary. Adjusted? Yes (✓) No ( )

Comments

Brief Shell Check Age Of House 100 Fireplace? Yes ( ) No (✓)
Damper? Yes ( ) No (✓)

Windows - Type STORMED Open? Closed? ✓

Doors - STORMED Insulation Levels? WALLS NONE R20-28

Brief Distribution System Check

Check Radiators - Sufficient? Yes ( ) No (✓)

Comments NO RAD IN MASTER BEDROOM

Bleeders Present Yes (✓ No ( ) Valves? Yes (✓) No ( )

Radiator Type - Iron (✓) Steel ( ) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes (✓) No ( )

Open System ( ) Closed System (✓) Water Heater Fuel ELECTRIC

Visual Check Of Distribution System Okay ( ) Poor (✓)

Note Deficiencies

Homeowner Comfort Problems

Chimney - Masonry - Tile Lined ( ). Manufactured Type A ( )
No Liner ( ). Type B- ✓
Metal Liner ( ). Other

State Condition & Recommendations OK

Boiler Make SLANTFIN Model GALAXY

Input Rating 79000 Output Rating ______

Recharge Air Cushion Tank and indicate if done OK

Turn-up Thermostat.

Complete Following Combustion Test

CO^2 8.1 % Room Temp. — Stack Temp. — Net Stack 331

Efficiency 81.3 % Boiler Temp. 130 Actual Boiler Btuh 64,227

Heat Exchanger Condition - [✓ (A) Clean] (B) Average (C) Dirty

Clean Heat Exchanger If (B) or (C) Exists. Cleaned ___ Not Req'd. ✓

Check Combustion Chamber Condition - Good? ___ Poor? ___ Type ______

Comments IN-ACCESSABLE

Initial Metered Gas Input ______

Metered Input After Adjustment, If Any Adjustment Made NONE

Check Air Cushion Tank & Recharge If Necessary - OK (✓)

Recharged ( )

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments - PLACED REFLECTORS BEHIND RADS

Complete Combustion Test Two And Record.

CO^2 8.1 % Room Temp. ___ Stack Temp. ___ Net Stack Temp. 331

Efficiency 81.3 % New Boiler Temp. 130 New Boiler Btuh 64,227

% Efficiency Change After Tune-up 0 %

Is there sufficient combustion air? Yes (✓) No ( )

Comments ______

Check Limit Switch. OK (✓) Replace ( )

Check Other Safety Devices ______

Lower Thermostat To Original Setting

Initial Aquastat Temp. Settings? NA ON NA OFF. Adjust to [✓ 100°F.]

USE OTHER SIDE TO INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?)

New Radiators

Valve and or piping changes PRESSURE RELEASE VALVE REQUIRES REPLACEMENT

Chimney repairs

Repairs (?) PROVIDED PUMP MOTOR WITH PROTECTION FROM WATER DRIPS

Other

Home owners estimated annual space heating cost $

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name ____ House # 11

Address ____ BRAMPTON

Phone ____ Visit Date FEB. 7/84

Water Heater Fuel GAS Clothes Dryer Fuel ELECTRIC

Thermostat- Location OK

- Make HONEYWELL Type COMFORT
- Comments OLD BI-METALLIC
- Anticipator Present NO Owner Sets Back? NO
- Normal Setting- Day 68°-70 °F Night SAME
- Thermostat Habits LEAVES ALONE

Comfort Problems? NORTHWEST BEDROOM COOL

-UPSTAIRS COOL

Boiler Make GURNEY Model ECONOMITE BURNER 718W - FORMER COAL

Fuel GAS Input Rating ? Output Rating ?

Boiler Age 33 YRS 6 YRS-BURNER Pump on Continuous Run? YES ?

Date Of Last Cleaning Or Tune-up? LAST FALL

Visual Check of Distribution System and Radiators STEEL RADS

BLEED RADS. RE-CHARGE TANK

Basement Temperature ____ Comments ____

Windows SOME DOUBLE & SOME TRIPLE GLAZED Opens NO

Doors STORM House Age 33 YRS

House Size 2600 sq ft Style 2 STORY

Insulation- Walls ONLY ONE WALL Ceiling R28

# of Occupants? 3 Unusual Setback Periods NO

Fireplace? YES - USES

Other Comments HOUSE WAS PREVIOUSLY HEATED WITH GRAVITY WARM AIR.

PIPE INSULATION REQUIRED

11

TOTAL TUNE-UP

GAS HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name HOUSE 11

Address BRAMPN/O#

Phone: Res. Bus. Date Of Visit MARCH 1/84

/By Time Arrived Time Out

Thermostat A Location OK (✓) Poor ( )
B Type BI-METALLIC

Check Anticipator & Adjust If Necessary. Adjusted? Yes ( ) No (✓)

Comments

Brief Shell Check Age Of House 33 Fireplace? Yes (✓) No ( )
Damper? Yes (✓) No ( )

Windows - Type SOME DOUBLE GLAZED
" TRIPLE " Open? Closed? ✓

Doors - STORMED Insulation Levels? CEILING R28

Brief Distribution System Check

Check Radiators - Sufficient? Yes (✓) No ( )

Comments

Bleeders Present Yes (✗) No ( ) Valves? Yes ✓) No ( )
DON'T WORK

Radiator Type - Iron (✓) Steel ( ) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes (✓) No ( )

Open System ( ) Closed System (✓) Water Heater Fuel GAS

Visual Check Of Distribution System Okay (✓) Poor ( )

Note Deficiencies

Homeowner Comfort Problems

Chimney - Masonry - Tile Lined ( ). Manufactured Type A ( )
No Liner ( ). Type B-
Metal Liner (✓). Other

State Condition & Recommendations OK

ECONOMITE
718 W

Boiler Make GURNEY Model ____ , ____

Input Rating 200,000 MAX Output Rating ____

Recharge Air Cushion Tank and indicate if done ____

Turn-up Thermostat.

Complete Following Combustion Test

CO^{2} 8.5 % Room Temp. ____ Stack Temp. ____ Net Stack 319

Efficiency 81.9 % Boiler Temp. ____ Actual Boiler Btuh ____

Heat Exchanger Condition - (A) Clean (B) Average [✓ (C) Dirty]

Clean Heat Exchanger If (B) or (C) Exists. Cleaned ✓ Not Req'd. ____

Check Combustion Chamber Condition - Good? ____ Poor? ✓ Type BRICK

Comments SHOULD BE RE-BUILT

Initial Metered Gas Input ____
Metered Input After Adjustment, If Any Adjustment Made ____
Check Air Cushion Tank & Recharge If Necessary - OK (✓)
Recharged ( )

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments - ____

Complete Combustion Test Two And Record.

CO^{2} 8.9 % Room Temp. ____ Stack Temp. ____ Net Stack Temp. 296

Efficiency 83 % New Boiler Temp. ____ New Boiler Btuh ____

% Efficiency Change After Tune-up 1 %
Is there sufficient combustion air? Yes (✓) No ( )

Comments ____
Check Limit Switch. OK (✓) Replace ( )

Check Other Safety Devices ____

Lower Thermostat To Original Setting

Initial Aquastat Temp. Settings? ____ ON ____ OFF. Adjust [✓ to 100°F].

USE OTHER SIDE TO INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?)

New Radiators

Valve and or piping changes AUTO BLEEDERS NOT WORKING

Chimney repairs

Repairs (?)

Other THINKING OF CHANGING TO HYDRO PULSE

Home owners estimated annual space heating cost $

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name House # 12

Address

Phone Visit Date JAN 23/84

Water Heater Fuel ELECTRIC Clothes Dryer Fuel ——

Thermostat- Location OK

- Make HONEYWELL Type SET BACK
- Comments SETTING & READING OUT OF ALIGNMENT
- Anticipator Present YES ↗SET AT 1.3 Owner Sets Back? YES
- Normal Setting- Day 68°F Night 63°F
- Thermostat Habits

Comfort Problems? DRAFTY

Boiler Make ?. BURNER ESSO Model

Fuel OIL Input Rating Output Rating 157,500

Boiler Age 86 YRS Pump on Continuous Run? NO

Date Of Last Cleaning Or Tune-up? MAY

Visual Check of Distribution System and Radiators NEEDS REFLECTORS

RE-CHARGE EXPANSION TANK

Basement Temperature COOL Comments NO RADS/UNINSULATED BOILER

Windows STORMED Opens CLOSED

Doors -STORM DOORS House Age 86 YRS

House Size 3500 Sq FT Style 3 STORY BRICK

Insulation- Walls NONE Ceiling added 8"-R28

# of Occupants? 6 Unusual Setback Periods NO

Fireplace? YES, USED SOMETIMES

Other Comments MORNINGS BEST FOR CONTRACTOR VISIT

3rd STORY HEATED BY BASE BOARD ELECTRIC.

12

TOTAL TUNE-UP

OIL HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name HOUSE 12

Address , BRAMPTON W/O#

Phone: Res. us. Date Of Visit FEB. 23/84

/By Time Arrived Time Out

Thermostat A Location OK (✓) Poor ( )
B Type

Check Anticipator & Adjust If Necessary. Adjusted? Yes (✓) No ( )

Comments

Brief Shell Check Age Of House 86 Fireplace? Yes (✓) No ( )
Damper? Yes (✓) No ( )

Windows - Type STORMED Open? Closed? ✓

Doors - STORMED Insulation Levels? WALLS - NONE
CEILING - 8"

Brief Distribution System Check

Check Radiators - Sufficient? Yes (✓) No ( )

Comments

Bleeders Present Yes (✓) No ( ) Valves? Yes (✓) No ( )

Radiator Type - Iron (✓) Steel ( ) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes (✓) No ( )

Open System ( ) Closed System (✓) Water Heater Fuel

Visual Check Of Distribution System Okay (✓) Poor ( )

Note Deficiencies

Homeowner Comfort Problems DRAFTY

Chimney - Masonry - Tile Lined (✓). Manufactured Type A ( )
No Liner ( ). Other - ______
Metal Liner ( ).

State Condition & Recommendations CHIMNEY WALL FELL APPART WHEN SMOKE PIPE WAS REMOVED.

Boiler Make ______ Model ESSO BURNER

Complete Following Combustion Test

Test 2 is conducted after all tune-up procedures have been completed.

COMBUSTION TEST PROCEDURE & INSPECTION DATA

1) Flame Ignit.-Instant (✓)(✓)
Delayed ( )( )
No Ignition ( )( )

2) Flame Colour (If flame in 2 Colours check both)
Orange ( )(✓)
Yellow (✓)(✓)
White ( )( )
Sparks ( )( )

3) Flame Shape Uniform (✓)(✓)
Lop-Sided ( )( )

4) Flame Impingement At Bottom ( )( )
At Sides ( )( )
At Rear ( )( )

5) Soot Deposit Flue (✓)( )
Comb.Chamber (✓)( )

6) Over Fire Draft In W.C. ( )( )

7) Flue Gas Temp .( )( )

8) Basement Air Temp. ( )( )

9) Net Stack Temp. (7-8) (491)(491)

10) Flue Draft in. of W.C. (.04)(.04)

11) % C.O.2 (6.9)(6.9)

12) Smoke Reading# (1)(1)

13) % Combustion Efficiency (74)(74)

14) Oil Pressure (PSI) ( )( )

15) Nozzle-Size (1.0)(1.0)
Type (A)(A)
Spray Ang. (70)(70)

Recharge air cushion tank and indicate if done ✓

Heat Exchanger Condition - (A) Clean (B) Average [✓ (C) Dirty]

Clean Heat Exchanger If (B) or (C) Exists. Cleaned ✓ Not Req'd.___

Check Combustion Chamber Condition - Good?___ Poor? ✓ Type BRICK

Comments HEAT EXCHANGER NOT CLEANED IN SEVERAL YEARS AS INDICATED BY INSULATION ON SMOKE DOME.

Boiler Btuh 103,600

Check Air Cushion Tank & Recharge If Necessary - OK ( )
Recharged (✓)

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments -

Initial Aquastat Temp. Settings?__On __Off. Adjust to 100 °F.

Complete Combustion Test Two And Record on page 2.

New Boiler Btuh? 103,600 % Improvement 0 %

Is there sufficient combustion air? Yes (✓) No ( )

Comments

Check Relay Safety Lockout____ Seconds On?____

Check Limit Switch OK ( ) Replace ( )

SERVICE MAN FAILED TO RECORD

Lower Thermostat To Original Setting

INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?)

Flame retention head kit (?)

New burner (?)

Flue damper (?)

Gas conversion burner (?) Yes

Chimney cleaning (?)

Repairs (?)

Other

Owners estimated annual space heating cost?

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name House # 13

Address

Phone Visit Date FEB 8/84

Water Heater Fuel ELECTRIC Clothes Dryer Fuel —

Thermostat- Location OK.

- Make PERFEX Type BI-METALIC
- Comments OLD
- Anticipator Present NO Owner Sets Back? YES
- Normal Setting- Day 68°F Night 61°F
- Thermostat Habits LOWERS SETTING IF OUT DURING DAY

Comfort Problems? MIDDLE ROOM UPSTAIRS TOO HOT

Boiler Make ARCO (CONVERTED COAL) (PEASE FOUNDRY Model ESSO BURNER

Fuel OIL Input Rating ? Output Rating ?

Boiler Age 120 YRS Pump on Continuous Run? YES

Date Of Last Cleaning Or Tune-up? 3 YRS

Visual Check of Distribution System and Radiators CAST IRON RADS. DOESNT BLEED RADS. NO REFLECTORS

Basement Temperature COOL Comments OK.

Windows SINGLE GLAZED Opens NO

Doors ONE STORMED, ONE NOT House Age 120 YRS

House Size 2532 Style 2 STORY

Insulation- Walls - NONE Ceiling YES ?

# of Occupants? 4 Unusual Setback Periods NO

Fireplace? YES, USED

Other Comments CHECK JAMB-CLOSED BAROMETRIC DAMPER CHECK CHIMNEY FOR SOOT. RECHARGE EXPANSION TANK. OWNER DOES NOT LIKE GAS HEATING.

13

TOTAL TUNE-UP

OIL HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name

Address W/O#

Phone: Res. Bus. Date Of Visit FEB 20/84

/By Time Arrived 9AM Time Out

Thermostat A Location OK (✓) Poor ( )
B Type OLD BY-METALLIC

Check Anticipator & Adjust If Necessary. Adjusted? Yes ( ) No (✓)

Comments NO ANTICIPATOR

Brief Shell Check Age Of House 120 Fireplace? Yes (✓) No ( )
Damper? Yes (✓) No ( )

Windows - Type SINGLE GLAZED Open? Closed? ✓

Doors - ONE STORMED Insulation Levels? NONE IN WALLS SOME IN CEILING.

Brief Distribution System Check

Check Radiators - Sufficient? Yes (✓) No ( )

Comments AUTOFILE NOT WORKING - LOW PRESSURE IN SYSTEM

Bleeders Present Yes ( ) No ( ) Valves? Yes (✓) No ( )

Radiator Type - Iron (✓) Steel ( ) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes (✓) No ( )

Open System ( ) Closed System (✓) Water Heater Fuel ELECTRIC

Visual Check Of Distribution System Okay (✓) Poor ( )

Note Deficiencies

Homeowner Comfort Problems SOME ROOMS COOL.

Chimney - Masonry - Tile Lined ( ). Manufactured Type A ( )
No Liner (✓). Other - ____________
Metal Liner ( ).

State Condition & Recommendations ?

Boiler Make ARCO Model ESSO BURNER

Complete Following Combustion Test

Test 2 is conducted after all tune-up procedures have been completed.

COMBUSTION TEST PROCEDURE & INSPECTION DATA

1) **Flame Ignit.-Instant** (✓)(✓)
Delayed ( )( )
No Ignition ( )( )

2) **Flame Colour** (If flame in 2 Colours check both) Orange ( )( )
Yellow (✓)(✓)
White ( )( )
Sparks ( )( )

3) **Flame Shape** Uniform (✓)(✓)
Lop-Sided ( )( )

4) **Flame Impingement** At Bottom ( )( )
At Sides ( )( )
At Rear ( )( )

5) **Soot Deposit** Flue ( )( )
Comb.Chamber ( )( )

6) **Over Fire Draft In W.C.** ( )( )*

AIR SHUTTER MISSING SO CANNOT ADJUST AIR.

7) **Flue Gas Temp.** ( )( )

8) **Basement Air Temp.** ( )( )

9) **Net Stack Temp. (7-8)** (400) (400)

10) **Flue Draft in. of W.C.** (.05) (.05)

11) **% C.O.2** (5.7) (5.7)

12) **Smoke Reading#** (/) (/)

13) **% Combustion Efficiency** (72) (72)

14) **Oil Pressure (PSI)** ( )( )

15) **Nozzle-Size** ( )( )
Type ( )( )
Spray Ang. ( )( )

COULD NOT REMOVE
[illegible] TO [illegible] NOZZLE

Recharge air cushion tank and indicate if done YES

Heat Exchanger Condition - (A) Clean [✓ (B) Average] (C) Dirty

Clean Heat Exchanger If (B) or (C) Exists. Cleaned ✓ Not Req'd. ___

Check Combustion Chamber Condition - Good? ___ Poor? ✓ Type BRICK

Comments CEMENT BROKEN

Boiler Btuh ______ NA ______

Check Air Cushion Tank & Recharge If Necessary - OK ( )
Recharged (✓)

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments - ______

______

Initial Aquastat Temp. Settings?___On ___Off. Adjust to 100 °F.

Complete Combustion Test Two And Record on page 2.

New Boiler Btuh? NA ______ % Improvement ______

Is there sufficient combustion air? Yes (✓) No ( )

Comments ______

Check Relay Safety Lockout ______ Seconds On?____

Check Limit Switch OK ( ) Replace ( )

Lower Thermostat To Original Setting

SERVICE MAN FAILED TO RECORD

INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?) ______

______

______

Flame retention head kit (?) ______

______

New burner (?) ______

______

______

Flue damper (?)

Gas conversion burner (?)

Chimney cleaning (?)

Repairs (?) REQUIRES NEW SMOKE PIPE
AND BAROMETRIC DAMPER

Other

Owners estimated annual space heating cost?

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name ________ House # 14

Address ________ BRAMPTON

Phone ________ Visit Date FEB 8/84 3PM

Water Heater Fuel ELECTRIC Clothes Dryer Fuel ________

Thermostat- Location OK

- Make SLANT FIN Type NORMAL
- Comments SET FOR .4 - NOW SET AT EXTREME END
- Anticipator Present YES Owner Sets Back? NEVER
- Normal Setting- Day 68 °F Night SAME
- Thermostat Habits LEAVES ALONE

Comfort Problems? NO

Boiler Make MALIBU SLANT FIN Model ________

Fuel OIL Input Rating 132,000 Output Rating 120,000

Boiler Age 6 YRS Pump on Continuous Run? ?

Date Of Last Cleaning Or Tune-up? LAST FALL

Visual Check of Distribution System and Radiators IRON RADS

Basement Temperature COOL Comments UNFINISHED - OK

Windows YES STORMED Opens NO

Doors FRONT NOT STORMED House Age PRIOR TO 1867 120+ YRS

House Size 2000 sq ft + Style 2 STOREY STUCO

Insulation- Walls NONE Ceiling added some

# of Occupants? 1 Unusual Setback Periods ________

Fireplace? YES - USES

Other Comments CHARGE EXPANSION TANK

CHECK BOILER - OVER HEATING & CORRODING SIDE PANEL.

14

TOTAL TUNE-UP

OIL HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name HOUSE 14

Address ____ W/O# ____

Phone: Res. ____ Bus. ____ Date Of Visit ____

/By ____ Time Arrived ____ Time Out ____

Thermostat A Location OK (x) Poor ( )
B Type ____

Check Anticipator & Adjust If Necessary. Adjusted? Yes ( ) No ( )

Comments ____

Brief Shell Check Age Of House ___ Fireplace? Yes ( ) No ( )
Damper? Yes ( ) No ( )

Windows - Type ____ Open? ____ Closed? ____

Doors - ____ Insulation Levels? ____

Brief Distribution System Check

Check Radiators - Sufficient? Yes (x) No ( )

Comments ____

Bleeders Present Yes (x) No ( ) Valves? Yes ( ) No ( )

Radiator Type - Iron (x) Steel ( ) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes ( ) No (✓)

Open System ( ) Closed System (✓) Water Heater Fuel ELECT

Visual Check Of Distribution System Okay (✓) Poor ( )

Note Deficiencies ____

Homeowner Comfort Problems NONE

____

Chimney - Masonry - Tile Lined ( ). Manufactured Type A ( )
No Liner (x). Other - ______
Metal Liner ( ).

State Condition & Recommendations Bad shape
______

Boiler Make Slant fin malibu Model ______

Complete Following Combustion Test

Test 2 is conducted after all tune-up procedures have been completed.

COMBUSTION TEST PROCEDURE & INSPECTION DATA

1) Flame Ignit.-Instant ( )( )
Delayed ( )( )
No Ignition ( )( )

2) Flame Colour (If flame in 2 Colours check both)
Orange ( )( )
Yellow ( )( )
White ( )( )
Sparks ( )( )

3) Flame Shape Uniform ( )( )
Lop-Sided ( )( )

4) Flame Impingement
At Bottom ( )( )
At Sides ( )( )
At Rear ( )( )

5) Soot Deposit Flue ( )( )
Comb.Chamber ( )( )

6) Over Fire Draft In W.C. ( )( )

7) Flue Gas Temp .( )( )

8) Basement Air Temp. ( )( )

9) Net Stack Temp. (7-8) (3[illegible])(341)

10) Flue Draft in. of W.C. ( )( )

11) % C.O.2 ( )( )

12) Smoke Reading# ( )( )

13) % Combustion Efficiency ( )( )

14) Oil Pressure (PSI) ( )( )

15) Nozzle-Size ( )( )
Type ( )( )
Spray Ang. ( )( )

Recharge air cushion tank and indicate if done needs new boile

Heat Exchanger Condition - (A) Clean (B) Average [✓ (C) Dirty]

Clean Heat Exchanger If (B)or(C) Exists. Cleaned___Not Req'd.___

Check Combustion Chamber Condition - Good?___Poor? ✗ Type______

Comments MUST BE REPLACED

Boiler Btuh____

Check Air Cushion Tank & Recharge If Necessary - OK ( )
Recharged ( )

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments - ____

____

Initial Aquastat Temp. Settings?___On ___Off. Adjust to 100 °F.

Complete Combustion Test Two And Record on page 2.

New Boiler Btuh?____________% Improvement____________

Is there sufficient combustion air? Yes ( ) No ( )

Comments____

Check Relay Safety Lockout____________________Seconds On?____

Check Limit Switch OK ( ) Replace ( )

Lower Thermostat To Original Setting

INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?) Owner doesn't want one

____

____

Flame retention head kit (?)____

____

New burner (?)____

____

____

Flue damper (?)

Gas conversion burner (?)

Chimney cleaning (?) needs liner

Repairs (?) Replace boiler & vent pipe.

Other

Owners estimated annual space heating cost?

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name House # 15

Address BRAMPTON,

Phone Visit Date FEB. 13/84

Water Heater Fuel GAS Clothes Dryer Fuel ELECTRIC

Thermostat- Location OK

- Make GENERAL CONTROLS Type T80
- Comments - ALIGNMENT OUT
- Anticipator Present NO Owner Sets Back? YES
- Normal Setting- Day 72°F Night 67°F
- Thermostat Habits INCREASES SETTING WHEN COOL

Comfort Problems? LIVING ROOM & KITCHEN COOL

Boiler Make EMCO Model JET HEAT

Fuel GAS Input Rating ? 25 PSIG Output Rating ?

Boiler Age 28 YRS Pump on Continuous Run? NO

Date Of Last Cleaning Or Tune-up? CLEANED MARCH/83 ($25.00)

Visual Check of Distribution System and Radiators IRON RADS

BLEEDS RADS

Basement Temperature COOL Comments OK

Windows STORMED Opens NO

Doors STORMED House Age 109 YRS

House Size 1600 sq ft Style STOREY AND ONE HALF

Insulation- Walls R12 + R4u Bd Ceiling SOME? 4"

# of Occupants? 3 Unusual Setback Periods NO

Fireplace? NO

Other Comments RECHARGE EXPANSION TANK

15

TOTAL TUNE-UP

GAS HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name HOUSE 15

Address , BRAMPTON/O#

Phone: Res. Bus. Date Of Visit FEB 21/84

/By Time Arrived Time Out

Thermostat A Location OK (✓) Poor ( )
B Type
Check Anticipator & Adjust If Necessary. Adjusted? Yes ( ) No (✓)

Comments

Brief Shell Check Age Of House 107 Fireplace? Yes ( ) No (✓)
Damper? Yes ( ) No ( )

Windows - Type STORMED Open? Closed? ✓

Doors - " Insulation Levels?

Brief Distribution System Check

Check Radiators - Sufficient? Yes (✓) No ( )

Comments
Bleeders Present Yes ( ) No (✓) Valves? Yes ( ) No (✓)

Radiator Type - Iron (✓) Steel ( ) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes (✓) No ( )

Open System ( ) Closed System (✓) Water Heater Fuel GAS

Visual Check Of Distribution System Okay (✓) Poor ( )

Note Deficiencies

Homeowner Comfort Problems

Chimney - Masonry - Tile Lined ( ). Manufactured Type A ( )
No Liner ( ). Type B-
Metal Liner ( ). Other
State Condition & Recommendations

ASBESTOS SEWAGE PIPE

Boiler Make EMCO Model JETHEAT

Input Rating NA Output Rating NA

Recharge Air Cushion Tank and indicate if done________

Turn-up Thermostat.

Complete Following Combustion Test

CO^2 5.1 % Room Temp.____ Stack Temp.____ Net Stack 311

Efficiency 77 % Boiler Temp.____ Actual Boiler Btuh________

Heat Exchanger Condition - (A) Clean (B) Average [✓ (C) Dirty]

Clean Heat Exchanger If (B) or (C) Exists. Cleaned X Not Req'd.____

Check Combustion Chamber Condition - Good?____ Poor?____ Type________

Comments HEAT EXCHANGE NOT CLEANED FOR YEARS

Initial Metered Gas Input________
Metered Input After Adjustment, If Any Adjustment Made________
Check Air Cushion Tank & Recharge If Necessary - OK (✓)
Recharged (   )

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments - ________

Complete Combustion Test Two And Record.

CO^2 5.4 % Room Temp.____ Stack Temp.____ Net Stack Temp. 292

Efficiency 79 % New Boiler Temp.____ New Boiler Btuh________

% Efficiency Change After Tune-up 2 %
Is there sufficient combustion air? Yes (✓) No (   )

Comments________
Check Limit Switch. OK (✓) Replace (   )

Check Other Safety Devices________

Lower Thermostat To Original Setting

Initial Aquastat Temp. Settings?____ON____OFF. Adjust [✓ to 100°F.]

USE OTHER SIDE TO INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?) yES, ______

______

______

New Radiators ______

______

______

Valve and or piping changes ______

______

______

Chimney repairs ______

______

______

Repairs (?) ______

______

______

Other ______

______

______

______

______

______

______

Home owners estimated annual space heating cost $ ______

______

______

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name ______ House # 16

Address ______ , BRAMPTON , ______

Phone ______ Visit Date FEB. 13/84

Water Heater Fuel ELECTRIC Clothes Dryer Fuel ELECTRIC

Thermostat- Location OK

- Make SEARS (WHITE ROGERS) Type SETBACK
- Comments ______
- Anticipator Present YES Owner Sets Back? YES
- Normal Setting- Day 18°C Night 16°C
- Thermostat Habits LEAVES ALONE

Comfort Problems? MAIN FLOOR BEDROOM COOL

______

Boiler Make RUUDIATOR Model 220

Fuel GAS Input Rating 220,000 Output Rating 176,000

Boiler Age ? Pump on Continuous Run? NO

Date Of Last Cleaning Or Tune-up? 2YRS

Visual Check of Distribution System and Radiators STEEL RADS

BLEEDS RADS. RECHARGE EXPANSION TANK

Basement Temperature OK Comments ______

Windows STORMED Opens NO

Doors STORMED House Age 37YRS

House Size 1800 sq ft Style 2 STORY

Insulation- Walls YES-UPSTAIRS NONE DOWNSTAIRS Ceiling R28

# of Occupants? 5 Unusual Setback Periods NO

Fireplace? YES IN BASEMENT - SOMETIMES USED

Other Comments ______

16

TOTAL TUNE-UP

GAS HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name House

Address W/O#

Phone: Res. Bus. Date Of Visit FEB.20/84

/By Time Arrived Time Out

Thermostat A Location OK (✓) Poor ( )
B Type SETBACK

Check Anticipator & Adjust If Necessary. Adjusted? Yes (✓) No ( )

Comments

Brief Shell Check Age Of House 37 Fireplace? Yes (✓) No ( )
Damper? Yes (✓) No ( )

Windows - Type STORMED Open? Closed? ✓

Doors - Insulation Levels? CEILING R28

Brief Distribution System Check

Check Radiators - Sufficient? Yes (✓) No ( )

Comments

Bleeders Present Yes (✓) No ( ) Valves? Yes (✓) No ( )

Radiator Type - Iron ( ) Steel (✓) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes (✓) No ( )

Open System ( ) Closed System (✓) Water Heater Fuel ELECTRIC

Visual Check Of Distribution System Okay (✓) Poor ( )

Note Deficiencies COOL

Homeowner Comfort Problems NONE

Chimney - Masonry - Tile Lined ( ). Manufactured Type A ( )
No Liner ( ). Type B- ✓
Metal Liner (✓). Other

State Condition & Recommendations

OK.

Boiler Make RUD Model 220

Input Rating 220,000 Output Rating ____

Recharge Air Cushion Tank and indicate if done ____

Turn-up Thermostat.

Complete Following Combustion Test

CO^2 7.7 % Room Temp. ____ Stack Temp. ____ Net Stack 440

Efficiency 79 % Boiler Temp. ____ Actual Boiler Btuh 173,800

Heat Exchanger Condition - (A) Clean [✓ (B) Average] (C) Dirty

Clean Heat Exchanger If (B) or (C) Exists. Cleaned ✓ Not Req'd. ____

Check Combustion Chamber Condition - Good? ____ Poor? ✓ Type ____

Comments CORROSION FROM PILOT FLAMES & SHORT RUNS

Initial Metered Gas Input ____
Metered Input After Adjustment, If Any Adjustment Made ____
Check Air Cushion Tank & Recharge If Necessary - OK ( )
Recharged (✓)

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments - ____

Complete Combustion Test Two And Record.

CO^2 7.9 % Room Temp. ____ Stack Temp. ____ Net Stack Temp. 400

Efficiency 79 % New Boiler Temp. ____ New Boiler Btuh 173,800

% Efficiency Change After Tune-up 0 %
Is there sufficient combustion air? Yes ( ) No (✓)

Comments ____
Check Limit Switch. OK (✗) Replace ( )

Check Other Safety Devices ____

Lower Thermostat To Original Setting

Initial Aquastat Temp. Settings? ___ON___OFF. Adjust to [✓ 100°F.]

USE OTHER SIDE TO INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?)

New Radiators

Valve and or piping changes

Chimney repairs

Repairs (?)

Other CONTINUOUS RUN PUMP

INDOOR/OUTDOOR STAT.

Home owners estimated annual space heating cost $

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name House # 1

Address , BRAMPTON

Phone Visit Date FEB. 13/84

Water Heater Fuel ELECTRIC Clothes Dryer Fuel

Thermostat- Location OK.

- Make WHITE ROGERS Type STD - NEW
- Comments CHECK CALIBRATION
- Anticipator Present YES Owner Sets Back? NO
- Normal Setting- Day 23½ °C Night SAME
- Thermostat Habits LEAVES ALONE

Comfort Problems? FAMILY ROOM COOL - NEEDS PIPE OR CRAWLSPACE INSULATION. BLEED RADS. RECHARGE EXPANSION TANK

Boiler Make CHROMOLUX Model CWF R27

Fuel ELECTRIC Input Rating 27K Output Rating 27K

Boiler Age 3 YRS Pump on Continuous Run? YES

Date Of Last Cleaning Or Tune-up? NOT APPLICABLE

Visual Check of Distribution System and Radiators BUILT-IN RADS

Basement Temperature OK Comments OK

Windows STORMS Opens NO

Doors STORMS House Age 38 YRS

House Size 1500 sq ft Style 2 STOREY

Insulation- Walls NONE Ceiling SOME?

# of Occupants? 3 Unusual Setback Periods

Fireplace? NO

Other Comments

TOTAL TUNE-UP

ELECTRIC HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name

Address W/O#

Phone: Res. Bus. Date Of Visit FEB. 28/84

/By Time Arrived Time Out

Thermostat A Location OK (✓) Poor ( )
B Type WHITE ROGERS NEW.

Check Anticipator & Adjust If Necessary. Adjusted? Yes (✓) No ( )

Comments CONTROL CIRCUIT DRAW WAS .15 SO CHANGED FROM .4

Brief Shell Check Age Of House 75 Fireplace? Yes (✓) No ( )
Damper? Yes (✓) No ( )

Windows - Type STORMED Open? Closed? ✓

Doors - STORMED Insulation Levels? WALLS NONE
CEILING SOME?

Brief Distribution System Check

Check Radiators - Sufficient? Yes (✓) No ( )

Comments INSTALLED REFLECTORS

Bleeders Present Yes (✓) No ( ) Valves? Yes (✓) No ( )

Radiator Type - Iron (✓) Steel ( ) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes (✓) No ( )

Open System ( ) Closed System (✓) Water Heater Fuel

Visual Check Of Distribution System Okay ( ) Poor ( )

Note Deficiencies

Homeowner Comfort Problems

Boiler Make CHROMOLUX Model CWF-R27

Input Rating 27KW Recharge Air Cushion Tank & Indicate ✓

Turn-up Thermostat.

Complete Following Test

Boiler Temp. ?

Check Air Cushion Tank & Recharge If Necessary - OK (✓)
Recharged (   )

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments -

Check Limit Switch. OK (✓) Replace (   )

Check Other Safety Devices

Lower Thermostat To Original Setting

Initial Aquastat Temp. Settings?___ON___OFF. Adjust to [✓ 100°F.]

SUGGESTED IMPROVEMENTS

Setback thermostat (?) DOES NOT WANT

New Radiators

Valve and or piping changes

Repairs (?)

Other

Owners estimated annual space heating cost? $

PROJECT MANAGERS

HYDRONIC CHECK LIST

Owners Name ____ House # 17

Address ____

Phone ____ Visit Date MAR. 6/84

Water Heater Fuel ELECTRIC Clothes Dryer Fuel ——

Thermostat- Location OK

- Make HONEYWELL Type STD
- Comments ____
- Anticipator Present YES Owner Sets Back? YES
- Normal Setting- Day 68°F Night 66°F
- Thermostat Habits ____

Comfort Problems? NONE

Boiler Make DOMINION NO. 1 CONVERTED COAL Model CONROY BURNERS

Fuel OIL Input Rating ____ Output Rating ____

Boiler Age 2nd hand 15 YRS Pump on Continuous Run? NO

Date Of Last Cleaning Or Tune-up? LAST SUMMER

Visual Check of Distribution System and Radiators BLEEDS RADS

HAS FOIL BEHIND SOME RADS, RE CHARGE EXPANSION TANK

Basement Temperature COOL Comments OK

Windows STORMS-POOR QUALITY Opens NO

Doors STORMED House Age 100 YRS

House Size 1800 Style 2 STORY

Insulation- Walls NONE Ceiling ADDED ?

# of Occupants? 2 Unusual Setback Periods ____

Fireplace? WOOD STOVE-USES

Other Comments USES KEROSINE HEATER. DOESNT LIKE GAS.

USES KEROSINE [illegible]

18

TOTAL TUNE-UP

OIL HYDRONIC TUNE-UP

CHECK LIST

Homeowner's Name HOUSE 18

Address W/O#

Phone: Res. Bus. Date Of Visit APRIL 26/84

/By Time Arrived Time Out

Thermostat A Location OK (✗) Poor ( )
B Type

Check Anticipator & Adjust If Necessary. Adjusted? Yes ( ) No (✗)

Comments

Brief Shell Check Age Of House 100 F~~ireplac~~e? WOODSTOVE Yes (✓) No ( )
Damper? Yes (✓) No ( )

Windows - Type STORMED Open? Closed? YES

Doors - STORMED Insulation Levels? WALLS NONE
ADDED IN ATTIC

Brief Distribution System Check

Check Radiators - Sufficient? Yes (✓) No ( )

Comments

Bleeders Present Yes (✓) No ( ) Valves? Yes (✓) No ( )

Radiator Type - Iron (✓) Steel ( ) Convectors ( )

Bleed Rads If Req'd. Air Present? Yes (✓) No ( )

Open System ( ) Closed System (✓) Water Heater Fuel ELECTRIC

Visual Check Of Distribution System Okay (✓) Poor ( )

Note Deficiencies

Homeowner Comfort Problems NONE

Chimney - [✓ Masonry] - Tile Lined ( ). Manufactured Type A ( )
No Liner ( ). Other - ________
Metal Liner ( ).

State Condition & Recommendations CANT TELL

Boiler Make DOMINION #1 COAL **Model** CONROY BURNER

Complete Following Combustion Test

Test 2 is conducted after all tune-up procedures have been completed.

COMBUSTION TEST PROCEDURE & INSPECTION DATA

1) Flame Ignit.	Instant	(x)	(x)
	Delayed	( )	( )
	No Ignition	( )	( )
2) Flame Colour (If flame in 2 Colours check both)	Orange	(x)	(x)
	Yellow	( )	( )
	White	( )	( )
	Sparks	(x)	(x)
3) Flame Shape	Uniform	( )	( )
	Lop-Sided	( )	( )
4) Flame Impingement	At Bottom	( )	( )
	At Sides	( )	( )
	At Rear	( )	( )
5) Soot Deposit	Flue	(x)	(x)
	Comb.Chamber	(x)	(x)
6) Over Fire Draft In W.C.		( )	( )

7) Flue Gas Temp.	( )	( )
8) Basement Air Temp.	( )	( )
9) Net Stack Temp. (7-8)	(715)	(715)
10) Flue Draft in. of W.C.	(.04)	(.04)
11) % C.O.2	(6.3)	(6.3)
12) Smoke Reading#	(#5)	(5)
13) % Combustion Efficiency	(62)	(62)
14) Oil Pressure (PSI)	( )	( )
15) Nozzle-Size	(1.0)	(1.0)
Type	( )	( )
Spray Ang.	( )	( )

Recharge air cushion tank and indicate if done YES

Heat Exchanger Condition - (A) Clean (B) Average [✓ (C) Dirty] PARTIALLY

Clean Heat Exchanger If (B) or (C) Exists. Cleaned x Not Req'd.___

Check Combustion Chamber Condition - Good? ? Poor? ? Type______

Comments FURNACE REQUIRES AT LEAST ½ DAY OF CLEANING.

Boiler Btuh ~~140,000~~ 86,800

Check Air Cushion Tank & Recharge If Necessary - OK ( )
Recharged (✓)

Distribution System

If possible balance to satisfy customer complaints, if any.

Comments -

Initial Aquastat Temp. Settings?___On ___Off. Adjust to 100 °F.

Complete Combustion Test Two And Record on page 2.

New Boiler Btuh? 86,800 % Improvement 0

Is there sufficient combustion air? Yes (✓) No ( )

Comments

Check Relay Safety Lockout OK. Seconds On?____

Check Limit Switch OK (✓) Replace ( )

Lower Thermostat To Original Setting

INDICATE OTHER POSSIBLE IMPROVEMENTS TO THIS HEATING SYSTEM.

SUGGESTED IMPROVEMENTS

Setback thermostat (?)

Flame retention head kit (?)

New burner (?)

Flue damper (?)

Gas conversion burner (?)

Chimney cleaning (?)

Repairs (?) BOILER SHOULD HAVE GOOD CLEANING

Other

Owners estimated annual space heating cost?

POOR

QUALITY

ORIGINAL